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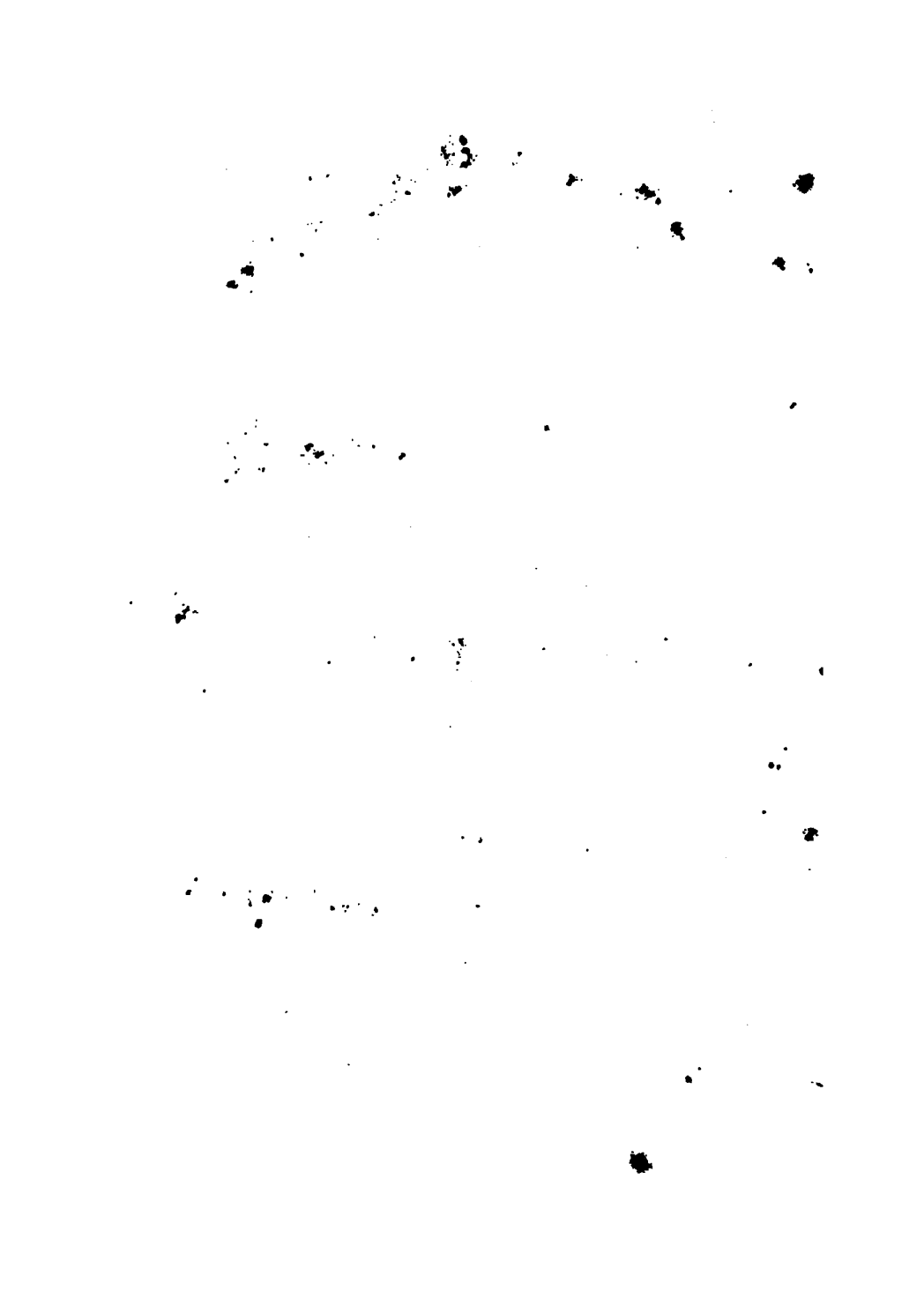
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ABRIDGMENTS
OF THE
Specifications
RELATING TO
AIDS TO LOCOMOTION.

PRINTED BY ORDER OF THE COMMISSIONERS OF PATENTS.



35

LONDON:
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P R E F A C E.

THE Indexes to Patents are now so numerous and costly as to be placed beyond the reach of a large number of inventors and others to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of Invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Subject-matter, Reference, and Alphabetical Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the latter are sold have been added.

Many Specifications being yet unpublished, the only guide in discriminating subjects in such cases has been the titles of Patents, which are frequently defective, and may therefore have led to an occasional omission.

When the entire series of Specifications shall have been printed it is intended to publish a new and complete edition of these Abridgments ; meanwhile, the manifest usefulness of such works, and the urgency of the demand

for copies, have been considered a sufficient justification for the present issue.

In this series of Abridgments, under the title of "Aids to Locomotion," are included the following contrivances which have been invented for facilitating the progress of carriages or vehicles and agricultural implements over yielding and unyielding surfaces :—

Broad wheels and rollers.

Endless travelling railways : comprising endless chains of rollers—endless chains or connected series of short rails—series of rails or supporting pieces, applied separately to the wheel, but acting as a continuous railway—circular rails.

Wheels with spikes, projections, or ribs on their tires, to give them a firm hold upon the ground.

Wheels with teeth to gear into fixed racks, for the purpose of more easily ascending railway inclines, &c.

Endless series of claws or feet, for catching hold of the earth in succession, and impelling the carriage.

Impelling legs or levers, which, by repeated backward strokes, force the carriage onward.

Supporting legs, by which the carriage or implement is converted into a walking machine.

Wheels without tires, or with divided peripheries.

Wheels made with elastic or flexible peripheries, whereby a larger surface is caused to bear upon the ground or rail, and the bite of the wheel is increased.

PREFACE.

v

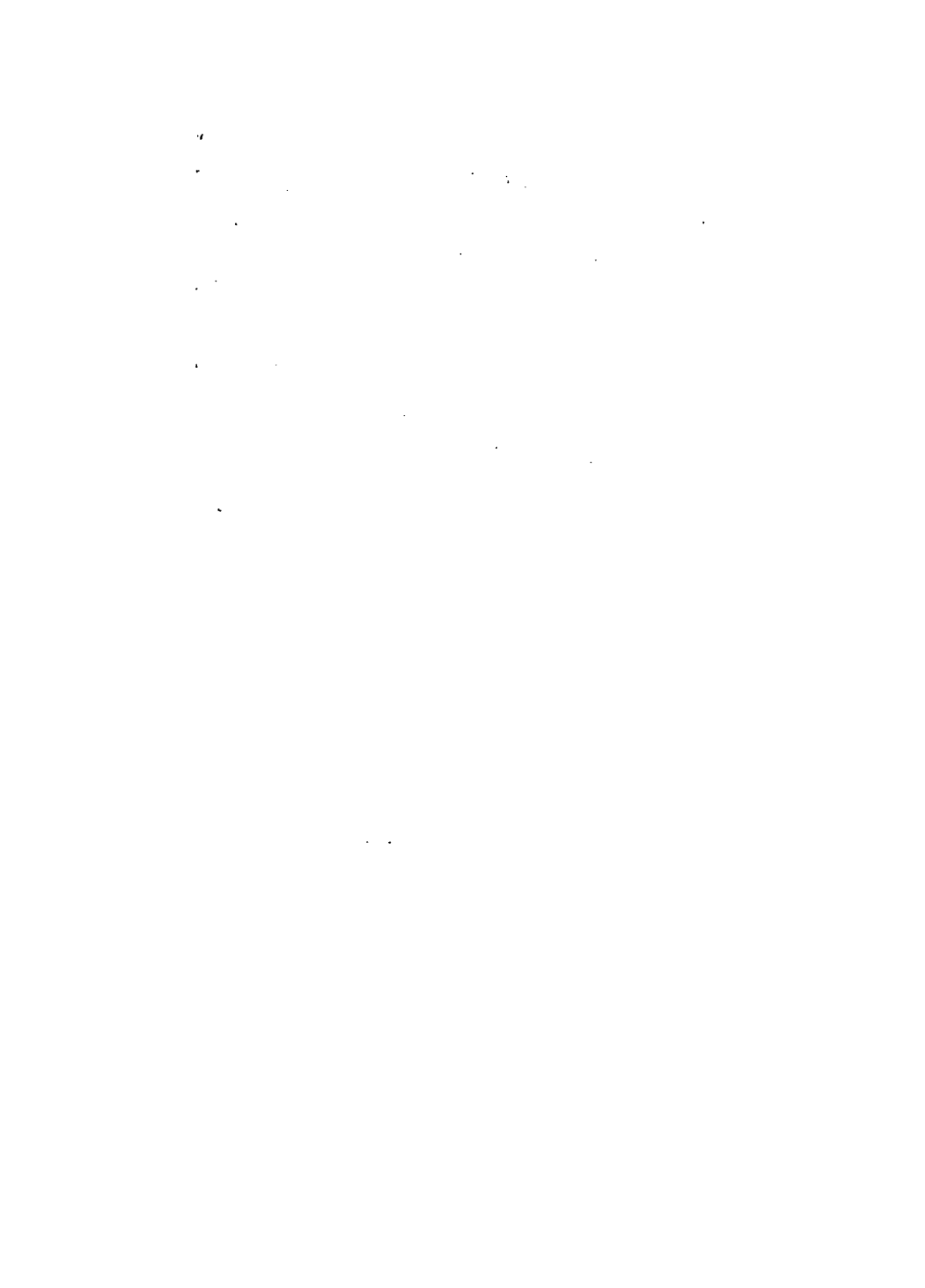
Fitting carriages and implements with a single broad wheel or roller ; and constructing vehicles of cylindrical and spherical forms.

Wheels having tires inlaid with wood, horn, india-rubber, gutta-percha, hide, leather, &c.

Screw propellers, to act against stationary points of resistance, and impel the carriage or implement.

Substitutes for supporting wheels or rollers.

B. WOODCROFT.



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AIDS TO LOCOMOTION.

A.D. 1691, October 1.—N^o 277.

EDISBURY, KENDRICK.—“A new art or invention of certaine
“rollers, to be vsed vnder the bodies of carriages, carts, and
“waggones instead of wheeles, which will be farr more vsefull then
“wheeles, by amending and preserueing aswell the high wayes as
“private grounds.”

[No Specification enrolled. Letters Patent printed, price 3*d*. See *Mechanics' Magazine*, vol. 36, p. 474; *Webster's Reports*, vol. 1, p. 35; *Carpmael's Reports on Patent Cases*, vol. 1, p. 35; *Davies on Patents*, p. 36; *Parliamentary Report*, 1829 (Patent Law), p. 188; *Salkeld's Reports*, vol. 2, p. 447; *Holt's Reports*, p. 475; and *Comberbach's Reports*, p. 84.]

A.D. 1722, July 12.—N^o 450.

BARLOW, ANTHONY.—“A new addition of a wheele, iron
“barrs, plates, pinns, &c., to be fixed to any sort of coach, wag-
“gon, or cart, but more especially in the winter season, which,
“besides severall other advantages of less moment, will effectually
“preserve the road^e from being cutt and worn out as they now
“are, and render the same commodious and passable in the
“winter.”

[No Specification enrolled.]

A.D. 1770, February 5.—N^o 953.

EDGEWORTH, RICHARD LOVELL.—“Portable railway or
“artificial road, to move along with any carriage to which it is
“applied.” The patentee says, “My invention consists in making
“portable railways to wheel carriages, so that several pieces of
“wood are connected to the carriage, which it moves in regular
“succession in such manner that a sufficient length of railing is
“constantly at rest for the wheels to roll upon, and that when the
“wheels have nearly approached the extremity of this part of the

“railway their motion shall lay down a fresh length of rail in front, the weight of which in its descent shall assist in raising such part of the rail as the wheels have already passed over; and thus the pieces of wood which are taken up in the rear are in succession laid in the front, so as to furnish constantly a railway for the wheels to roll upon.”

The above description does not clearly explain the construction of the “portable railway,” and the Specification is not furnished with a drawing. It appears probable, however, from the following circumstances, that the pieces of wood above alluded to were connected together in such manner as to form an endless chain or series:—In vol. I. of Edgeworth’s Memoirs, page 169, it is stated,—“Even the method of locking carriages in turning, invented by Dr. Darwin and by me, had been employed in a sailing carriage, described in the *Machines Approuvées* of the French Royal Academy.” And at pages 170 and 171,—“After having made a number of models of my machine that should carry and lay down its own road, I took out a Patent to secure to myself the principle; but the term of my Patent has been long since expired, without my having been able to unite to my satisfaction, in this machine, strength with sufficient lightness, and with regular motion, so as to obtain the advantages I proposed. As an encouragement to perseverance, I assure my readers that I never lost sight of this scheme during forty years; that I have made considerably above one hundred working models upon this principle, in a great variety of forms; and that although I have not yet been able to accomplish my project, I am still satisfied that it is feasible. The experience which I have acquired by this industry has overpaid me for the trifling disappointments I have met with; and I have gained far more in amusement than I have lost by unsuccessful labor. Indeed, the only mortification that affected me was my discovering, many years after I had taken out my Patent, that the rudiments of my whole scheme were mentioned in an obscure memoir of the French Academy.”

Now at page 33 of Vol. III. of the “*Machines Approuvées* par l’Académie Royale des Sciences” there is a description of a sailing carriage, which, in the act of turning, rests upon four points of support, like the carriage invented by Dr. Darwin and Mr. Edgeworth; and at page 7 of the same volume there is an account of a truck or low carriage for heavy weights, provided with small

rollers or wheels, which travel upon an endless chain of rollers. It is therefore most likely that the latter description is the "obscure memoir" referred to by Mr. Edgeworth.

[Printed, 3d. See Rolls Chapel Reports, 6th Report, p. 160.]

A.D. 1800, February 4.—N° 2373.

LUMBERT, RICHARD.—This invention relates to improvements in drain ploughs, and in the means of giving motion thereto.

The frame of the plough travels on rollers; and it is drawn forward either by the labour of men or animals. In the former case, the power of several men is applied to turn a windlass-barrel on the plough-frame, and so wind up a chain secured to an anchor; or manual labour is employed to turn two windlass-barrels upon a frame or carriage, which travels upon four rollers, separate from the plough,—the carriage being held by an anchor and moveable struts or spurs during the operation of winding up the draught chain.

It is stated that the mole-share or cone may be furnished with a moveable steel point, having a spiral worm upon it, so that as it passes through the earth it will be caused to rotate (which motion will facilitate its progress through the earth), or a rotary or boring motion may be imparted to it by suitable gearing. With respect to this part of the invention, it should be remarked that various plans for employing a screw propeller, actuated by steam power, for giving motion to agricultural implements, have been proposed by subsequent patentees.

[Printed, 7d.]

A.D. 1801, September 12—N° 2538.

GERMAN, THOMAS.—This invention consists in facilitating the transit of carriages on common roads by substituting endless chains or series of rollers for the ordinary wheels. To illustrate the invention, the patentee describes a carriage, which, instead of being supported by four wheels, is carried by four sets of rollers; each set consisting of six rollers, connected together by links, and travelling around a sledge or bar, attached by a post or pillar to a cross-bar, which is affixed beneath the carriage in place of the axletree. As the carriage is drawn onward, each roller successively descends in front of the sledge, which then glides over it, the

roller at the same time turning; and when the sledge has passed over, the roller ascends, travels over the top, and again descends in front of the sledge.

[Printed, 7d.]

A.D. 1802, March 24.—N^o 2599.

TREVITHICK, RICHARD, and VIVIAN, ANDREW.—This Specification contains the description of a locomotive steam carriage adapted to run on common roads, but which may be also used on railways. The carriage is supported by four wheels. The axle of the fore wheels can be turned in order to guide the carriage. The power of the engine is communicated to the hind wheels through toothed gearing, so arranged that, in the act of turning the carriage, one wheel may-overrun the other, or either wheel may be readily disconnected from the engine. The patentees propose, when necessary, to adopt the following means of increasing the hold of the driving wheels upon common roads, or upon the rails of railways:—"It is also to be noticed that we do occasionally, or "in certain cases, make the external periphery of the wheels W "uneven, by projecting heads of nails, or bolts, or cross grooves, "or fittings to railroads, when required; and that in cases of hard "pull we cause a lever, belt, or claw to project through the rim "of one or both of the said wheels, so as to take hold of the "ground; but that in general the ordinary structure or figure of "the external surface of these wheels will be found to answer the "intended purpose."

[Printed, 1s. 1d. See Repertory of Arts, vol. 4 (*second series*), p. 241; Mechanics' Magazine, vol. 12, p. 162; Register of Arts and Sciences, vol. 4, pp. 316 and 332; Engineers and Mechanics' Encyclopædia, vol. 2, p. 386; Stuart's History of the Steam Engine, pp. 162 and 183; Stuart's Anecdotes of Steam Engines, vol. 2, p. 455; and Rolls Chapel Reports, 6th Report, p. 151.]

A.D. 1808, February 4.—N^o 3106.

DUMBELL, JOHN.—Part of this invention consists in substituting "Gothic or other kind of arches, globes, semi-globes, or "segments" for the ordinary wheels of carriages, in order to prevent sinking on inferior roads or bad ground. When semi-globes are used, they are mounted in pairs on the ends of a horizontal axle, in a similar manner to that adopted with the common wheels; the convex surfaces of the semi-globes being *outwards*. When globes are employed, they are placed in frames,

which permit them to turn freely in all directions, as they roll along the road, and sustain the weight of the vehicle. "The globes may also themselves be made vehicles for merchandize and other portable things. A waggon, for instance, may be constructed as one large globe, and divided into five or more compartments, in order to hold different kinds of merchandize."

[Printed, 1s. See Rolls Chapel Reports, 7th Report, p. 106.]

A.D. 1810, February 26.—N° 3309.

PRATT, MAJOR.—The inventor proposes to propel or impel agricultural implements and vehicles by means of endless chains extended horizontally over chain wheels, and having arms jointed thereto, carrying transverse bars provided with spikes or holders, which, when the chains are put in motion by wind, steam, or other power, will successively take hold of the ground and draw or impel the implement or vehicle. The patentee does not confine himself to any particular form of holder. He says, "The nature of this my said invention, with regard to vehicles of conveyance, being anything that is made to come or go forward by machinery, so as to lay hold of the ground, road, or anything placed for that purpose, so as thereby conveniently to carry the same forward up an inclined plane, up hill, or in bad roads."

[Printed, 1s. 5d. See Rolls Chapel Reports, 7th Report, p. 208.]

A.D. 1811, April 10.—N° 3431.

BLINKINSOP, JOHN.—Facilitating the conveyance of coals, minerals, and other articles, by fixing a toothed rack along the ground or road over which the goods are to be conveyed, and causing a toothed wheel, driven by a steam engine or other first mover upon a suitable carriage, to gear into the rack and propel the carriage, together with other carriages connected therewith. The patentee states, that he avails himself of the contrivances and expedients heretofore used for improving roads, "such as platforms, pavements, connected timbers, and more especially the iron railway, upon which I do by preference, in every instance, cause the untoothed or common wheels of my carriage to run;" and he either connects the rack to one of the rails or casts it therewith. If preferred, two toothed wheels may be used, gearing into corresponding racks on each side.

[Printed, 3d. See Repertory of Arts, vol. 21 (second series), p. 138; Register of Arts and Sciences, vol. 4, p. 441; and Engineers and Mechanics' Encyclopedia, vol. 2, p. 396.]

A.D. 1812, February 6.—N° 3536.

PALMER, WILLIAM.—The subject of this invention is the use of connected series or endless chains of rollers as substitutes for the wheels of carriages. The patentee says, “I make two applications of my invention, one which I call revolving rollers, and the other revolving roller wheels. The former consists of rollers of such a length as to extend from side to side beneath the carriage or heavy body to be moved; and these rollers rest on their whole length on the road, supporting the plane at the lower side of the carriage, either on the whole of their length, or only on a portion at each end, or at each end and in the middle. My revolving roller wheels are systems of short revolving rollers, which are applied and support the weight by blocks (having plane surfaces beneath), which are fixed at the sides of the carriage in the same direction as the wheels and axles now in use. The principle and manner of action of both the revolving rollers and the revolving roller wheels is the same; and they may be indifferently applied in the place of either the fore or hind wheels of any carriage, or as the sole support, instead of the wheels, of any two-wheel carriage.”

[Printed, 7*d.*]

A.D. 1813, May 22.—N° 3700.

BRUNTON, WILLIAM.—Propelling or drawing carriages upon roads and railways, and vessels on canals and inland waters, by means of levers, bars, or legs, worked by a steam-engine, and acting alternately or conjointly against the ground, or against racks, pins, ropes, chains, bars, or rods. Pieces of wood or metal, termed feet, are jointed to the lower extremities of the levers, bars, or legs, being suitably formed to act against the ground or against racks or pins. The pieces may be also made in such manner as to gripe or catch hold of a rope, chain, bar, or rod, and either draw the carriage or vessel or push it forward,—such pieces being termed hands in the former case, and feet in the latter.

[Printed 7*d.* See Repertory of Arts, vol. 24 (*second series*), p. 65; Register of Arts and Sciences, vol. 4, p. 442; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 398.]

A.D. 1814, April 27.—N° 3804.

GOMPERTZ, LEWIS.—1. “In place of the wheels heretofore used *in carriages*, I apply certain machinery which may be denomi-

“nated scapers, because they escape obstacles, and which have
“the property of supporting the carriage at the same distance from
“the ground or road while moving along, and at the same time
“escaping the friction of the ground, and having the best chance
“of escaping the obstacles in the road also (which otherwise would
“raise the carriage and load). This is effected by employing legs
“or feet to support the carriage when they are beneath it; and
“upon them it advances for a certain distance, during which time
“the feet are stationary on the ground, till succeeding legs being
“brought forward to support and advance the carriage in turn,
“and the legs which have performed their office are brought
“forward to repeat their action.” Three carriages are described
by the patentee. In the first carriage, the substitutes for
wheels each consist of four radial legs, revolving on a centre or
axletree in the usual situation; which radial legs have a power of
extension and contraction in right lines to and from their common
centre; and by means of certain curved pieces they are caused to
contract and extend in such manner (during the time that they
are in contact with the road) as to support and advance the centre
always at the same height.

The radial legs of the second carriage do not alter their length,
but slide across the centre or axle; each set consisting of two bars
with a foot at each end, sliding at right angles to each other across
a central wheel; and therefore the contraction of one foot produces
a corresponding extension of the foot on the opposite side
of the centre.

In the third carriage, the eight legs at each end are affixed to the
under side of two large wheels, at right angles thereto; these
wheels are placed edge to edge (which may be toothed), and turn
upon two short axles, projecting downwards from the bed or bottom
of the carriage in positions slightly inclined from the vertical,
whereby the outer edge of each wheel is depressed; and therefore
only that leg of each set which at the time is outermost bears upon
the ground, in order to support and carry forward the carriage.
Castors for furniture may be made upon this plan. The feet or
extremities of the legs may be made of any form adapted to the
nature of the ground they are to travel upon, or they may be furnished
with small wheels, which will allow the carriage to move
sidewise.

2. Improved axletrees for carriages.

3. Wheels for communicating motion in machines in lieu of the ordinary cog or toothed wheels.

[Printed, 1s. 5d. See Repertory of Arts, vol. 26 (*second series*), p. 193; Artizan, vol. 1 (*third series*), pp. 163 and 189; and Rolls Chapel Reports, 8th Report, p. 102.]

A.D. 1814, June 18.—N° 3817.

TINDALL, THOMAS.—In the Specification of these Letters Patent there is a description of a steam carriage, to be mounted on three or five wheels, and furnished with an engine of either the reciprocating or rotary kind, which may be assisted by a horizontal windmill, driven partly by the exhaust steam and partly by the action of the wind. The power of the engine is applied to cause four pushers or legs to come successively in contact with the ground and impel the carriage; and it is also proposed that the engine shall at the same time act upon the rim of the carriage wheels when ascending hills. The carriage may be used for the conveyance of passengers or for working agricultural implements.

[Printed, 1s. 2d. See Rolls Chapel Reports, 7th Report, p. 115.]

A.D. 1816, January 9.—N° 3973.

REYNOLDS, JOSEPH.—The patentee describes a steam carriage to be used for conveying passengers on ordinary roads or for drawing agricultural implements. The carriage is supported at the front by a single wheel, and at the back by two very broad wheels or rollers, which sustain the principal part of the weight of the carriage. The latter wheels are capable of rotating independently of each other; and to the inner side of each a toothed wheel is affixed. The power of the engine is communicated to these wheels by an arrangement of toothed gearing, which can be adjusted so as to cause one broad wheel to rotate in one direction whilst the other broad wheel is rotating in the opposite direction, and thus to turn the carriage in a very small space.

[Printed, 1s. 1d. See Rolls Chapel Reports, 8th Report, p. 115.]

A.D. 1819, September 27.—N° 4398.

BAYNES, JOHN.—Propelling a carriage by means of legs, which are put in motion by manual labour or other suitable power, and successively act against the ground in order to impel the vehicle. *In the drawing* a three-wheel carriage is represented, fitted with a

pair of legs, worked by two treadles. Each leg is jointed at the top to a connecting rod from its treadle, and also to the upper end of a long rod, which projects backward from a horizontal axis beneath the fore part of the carriage, and serves to support and guide the leg. The two supporting rods are connected by a cord, passing around a pulley; so that as one leg moves into an inclined position, in the act of pushing the carriage onward, the other leg is drawn by the cord into a vertical position or nearly so, in readiness to commence its pushing action.

[Printed, &c. See Repertory of Arts, vol. 45 (*second series*), p. 275; London Journal (*Newton's*), vol. 1, p. 234; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 409.]

A.D. 1821, July 26.—N° 4575.

BARRY, JOHN RICHARD.—Apparatus to be substituted for the ordinary wheels and axles of carriages. Beneath the carriage two rails or beams with rounded ends are fixed side by side in a horizontal position (forming what the patentee terms a horizontal railway); through these rails, at each end, a horizontal axle extends, carrying a pair of reels or chain wheels; and over the two pairs of reels are distended a couple of endless chains, which carry the axles of a series of antifriction rollers. These rollers travel in contact with the upper and under surfaces of the rails, and the ends of their axles are furnished with a corresponding number of wheels (of larger diameter than the rollers), which bear upon the road.

When the carriage is drawn upon a hard and smooth road, the wheels do not turn upon their axles as in ordinary carriages; for as the weight rests upon the top of the antifriction rollers, which are upon the same axles as the wheels that bear upon the road, the wheels act as rollers, advance with less velocity than the carriage, and are successively relieved by others. Soft, muddy, or yielding roads may be considered to present an accumulation or succession of obstructions perpetually operating to impede the progress of the wheels. Under these circumstances, or when travelling upon a road which is rugged or contains numerous obstructions, the wheels of the improved carriage, instead of passing over the obstructions, remain at rest; the carriage nevertheless advances upon the antifriction rollers until the rails have passed beyond the obstructions, when the wheels rise unimpeded,

pursue their course round the endless railway, and in the order of succession again descend upon the road before the rails.

To enable the carriage to turn angles or corners with ease, two sets of the above-described apparatus are to be used,—the hindmost set being firmly fixed to the carriage, and the foremost set being capable of turning on a centre pin like the ordinary fore wheels of a carriage.

[Printed, 8d. See London Journal (*Newton's*), vol. 3. p. 281; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 445.]

A.D. 1821, August 14.—N° 4581.

GORDON, DAVID.—Part of this invention consists in the application to a two, three, or four-wheel carriage of a hollow roller or drum; “which drum may be caused to move or roll along the road (in order to advance the carriage forwards), by having a steam or other engine placed within side of it, in such manner that the engine would tend to advance or climb up the inside of the drum, and so by its gravity to turn the drum round (in the manner of those machines termed walking wheels, which are used in cranes, &c.), and would roll it forwards, advancing the carriage along with it. To effect this, the drum may be furnished with one, two, or more endless racks, extending round its inside circumference; into which rack or racks a toothed wheel or wheels may be made to engage; such wheel or wheels being put in motion by the power of the engine.” The patentee recommends that the drum should be substituted for the hind wheels of the carriage, and be connected to the carriage frame by iron rods, jointed at one end to the frame, and at the other end to the axis of the toothed wheels within the drum.

[Printed, 7d. See Repertory of Arts, vol. 1 (*third series*), p. 78; and London Journal (*Newton's*), vol. 4, pp. 17 and 131.]

A.D. 1822, September 27.—N° 4709.

WHITCHER, JOHN, PICKFORD, MATTHEW, and WHITBOURN, JAMES.—Effecting an improvement in the construction of wheels by “the application of friction rollers of certain proportionate dimensions, connected together and revolving upon outer and inner circles, the circumferences of which circles must bear the same proportion to each other as the circumferences of the rollers bear to each other.” “The friction rollers are formed

“ with different radii in one piece, but act like two rollers of different diameters, joined together and revolving upon one common centre.” An annular plate or ring carries a series of short spindles, fixed therein at equal distances apart and forming the axles of the friction rollers, which are mounted thereon in pairs, one on each side of the annular plate, with the smaller part of each roller outside or farthest from the plate. The larger peripheries of the rollers move in contact with two rings affixed to the felloes of the wheel, and the smaller peripheries work against two smaller rings secured to the axle. The smaller and larger parts of each roller are made of such diameters relatively to each other, that the smaller part will perform a revolution upon the inner ring in the same time that the larger part makes a revolution upon the outer ring. The peripheries of the friction rollers may be formed with cogs, to gear into cogs on the inner and outer rings. Various modes of applying this antifriction apparatus to carriages may be adopted.

[Printed, 7d. See Repertory of Arts, vol. 43 (*second series*), p. 15; and London Journal (*Newton's*), vol. 5, p. 6.]

A.D. 1822, December 16.—N° 4737.

DUMBELL, JOHN.—This invention consists in constructing carriages or vehicles with feet or “millipedes,” as substitutes for wheels. The patentee says, “I accommodate the feet I use according to the ground I have to go over,—the cloven feet being wisely adapted by nature to some soils, the webbed feet to other places, the horse’s hoof, &c., to other situations where a circular motion is required. A boy rolling like a wheel along the roads, and using his hands and feet as spokes of a wheel, is descriptive of my method; so also is the Manks penny with the legs of a man upon it; and likewise the spokes in a coach wheel without felloes, or projecting beyond the felloes, or a given number of those spokes (*ad libitum*) projecting through the felloes; which spokes may be made more fit to pass over the highways, &c., if shod with iron or other hard body, and which, if required, may be made as horse shoes; or these shoes I attach to the felly of a coach wheel at such distances as may be required, with or without friction wheels between the respective shoes or alongside of them, and with or without springs acting at the heel and toe, in order that the shoes may move on a pivot or hinge, resembling

" the action or motion of a man's foot, the weight being received
 " on the heel and passing to the toe, and then delivered from the
 " toe of one foot to the heel of the next foot. When required, I
 " make the spokes or legs with joints in them, resembling the hip,
 " knees, and feet of men or other bodies, or with what is called in
 " mechanics a universal joint.

" Amongst the works of art, the rowel of a spur turning on an
 " axis and touching the ground will serve to describe another
 " method of applying my improvements, which may be made to
 " act per se like the wheel of a wheelbarrow, or affixed to as many
 " of the wheels now used for a coach as may be deemed expedient;
 " that part of a spur which goes over a man's heel being made
 " sufficiently strong for the purpose, and attached to the felly; a
 " sufficient number of such spurs being so fixed as will surround
 " the periphery of the said coach wheel, I also apply stilts,
 " crutches, and the tread wheel in moving vehicles, where the
 " labour of men can be substituted for horses: a man on stilts
 " being able to make longer strides than without them, can con-
 " sequently move over a greater space in the same distance of time.
 " In this case I provide a seat for a man to rest upon, like the seat
 " of a rocking horse; and crutches I apply like unto the method
 " of punting or shafting vessels. I apply the tread mill by erecting
 " it as on a waggon, having wheels similar to the wheels now in
 " use, or with millipedes as aforesaid; and I attach it to a coach
 " or other vehicle, either before the same, where the coach horses
 " now are attached, or behind the said vehicle."

[Printed, 8d. See Repertory of Arts, vol. 46 (*second series*), p. 405; and
 London Journal (*Newton's*), vol. 6, p. 78.]

A.D. 1824, December 18.—N^o 5056.

GORDON, DAVID.—Arrangement of mechanism for propelling
 a locomotive carriage over a railway or common road, or for pro-
 pelling ploughs, harrows, or other agricultural implements. " This
 " action is performed by the operation of a number of rods or
 " propellers; which rods or propellers are attached at one of their
 " extremities to a like number of cranks, situated upon one com-
 " mon axis across the carriage, near to the hind part thereof; whilst
 " their outermost extremities are formed as will be herein-after
 " described, so as to be capable of seizing the ground in a sufficient
 " degree to propel or drive the carriage or other machine aforesaid

“ forwards, being at the same time connected by rods or cords
 “ with the extremities of certain levers, which are operated upon
 “ by an equal number of excentric shapes or wheels,” fixed upon
 one common axis. As the crank axis and excentric wheel axis
 are caused to revolve with equal velocity by steam or other power,
 the rods or propellers will be forced or thrown out backwards,
 “ and by the form or shape of the excentric wheels the outermost
 “ extremities of the propellers will only remain in contact with the
 “ ground at the time when they are moving with the greatest
 “ velocity or nearly so ; at other times the extremities will, by the
 “ action of the excentric wheels, be taken up entirely off the
 “ ground.” The outer extremity of each propeller is furnished
 with an arched piece of metal or foot, the curved under surface
 whereof forms an arc of a circle, having the same radius as the
 circle described by the cranks which move the propellers. The
 under surface of the foot is shod with “ pieces of cork, short hair,
 “ whalebone, or other suitable material, set on end like a stiff
 “ hard brush ; the said substances to project a short distance be-
 “ yond the points or extremities of iron teeth. Thus if the flexible
 “ material should yield in any considerable degree, the points of
 “ the iron teeth aforesaid would come in contact with the ground
 “ and would act as propellers to advance the carriage forwards.”
 When the ground is covered with ice or hard snow, the feet are to
 be provided with steel points, which may project sufficiently to
 take hold of the ground and impel the carriage.

[Printed, 10d. See Repertory of Arts, vol. 1 (*third series*), p. 28 ; London
 Journal (*Newton's*), vol. 11, p. 76 ; Register of Arts and Sciences, vol. 2,
 pp. 33 and 321, also vol. 1 (*new series*), pp. 273 and 289 ; and Engineers and
 Mechanics' Encyclopædia, vol. 2, p. 460.]

A.D. 1825, May 14.—N° 5170.

GURNEY, GOLDSWORTHY.—Improved apparatus for propelling carriages by steam power on common roads or railways. The improved apparatus “ consists of two or more propellers, “ crutches, or feet, which at their lower ends act successively with “ a regulatable length and force of stroke or step against the sur- “ face of the road or way ; and at their upper ends such propellers “ react against the under side of a part of the perch or main rails “ connecting together the hind and the fore wheels of the carriage “ intended to receive locomotion, either on a common gravelled or “ metaled or a paved road, or on a railway formed of iron, hewn

"stone, or otherwise;—the said part of the perch being fitted or prepared on its under side for the tops of the said propellers to react against such perch under the middle or loaded part of the carriage, thro' the medium of rollers, in such manner that the said perch being a part of the carriage may roll over the upper ends of the said propellers during each stroke or step thereof."

[Printed, 7d. See Repertory of Arts, vol. 4 (*third series*), p. 426; London Journal (*Newton's*), vol. 13, p. 74; and Engineers and Mechanics' Encyclopædia, vol. 2, pp. 389 and 468.]

A.D. 1825, October 6.—N^o 5260.

CAYLEY, SIR GEORGE.—Application to four-wheel carriages of revolving or endless railways. The carriage wheels are made with a flange on each side, so as to form a groove or recess around the periphery for the reception of an endless chain, which constitutes the revolving railway. Two endless chains are used, one passing around the fore and hind wheels at one side of the carriage, and the other passing around the wheels on the opposite side. Each link of the chain is furnished with a short roller to bear upon the road, and also to facilitate the turning of the carriage (such roller standing at right angles to the link); or feet may be attached to the links in place of rollers. The joints of the links are so formed as to limit the angular motion of any two of the links relatively to each other by a stop, and thus to form a rigid railway for the carriage wheels to roll upon. As the carriage is drawn forward, the several links successively descend in front of the fore wheels; and after the wheels have passed over them, they ascend at the back of the hind wheels, and again advance to the front.

[Printed, 10d. See London Journal (*Newton's*), vol. 14, p. 188; Mechanics' Magazine, vol. 5, p. 226; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 474.]

A.D. 1825, October 13.—N^o 5267.

EASTON, JOSIAH.—Enabling locomotive engines or steam carriages to ascend inclined planes by causing a toothed wheel at the front of the engine or carriage to gear into the teeth of a rack fixed upon a raised path of stone laid along the middle of the road or railway, so that when the wheel is made to rotate, the engine or carriage will ascend the incline.

Constructing roads or ways for locomotive engines or steam or other carriages to travel upon, by fixing flat iron bars upon two parallel paths of stone. The wheels to travel thereon are made without flanges; and the carriage is prevented from leaving the track by means of small guide wheels or rollers beneath, which roll against the sides of an elevated range of stonework in the middle of the road or way.

[Printed, 9d. See London Journal (*Newton's*), vol. 11, p. 292; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 475.]

A.D. 1825, November 1.—N° 5274.

SEAWARD, JOHN, and SEAWARD, SAMUEL.—1. Propelling vessels by means of wheels or radial arms rolling or turning on the bottom or against the sides of canals, rivers, or other shallow waters.

2. Propelling locomotive engines on tramways or railways, and carriages on common roads, by means of a wheel or wheels (with knobs or projections on the periphery), connected either by a swinging frame or frames to the crank shaft of a steam engine or other moving power, or working in circular grooves, so as to rise and fall according to the roughness or unevenness of the ground, but supporting no part of the weight of the carriage; such weight being entirely supported by separate wheels.

[Printed, 7d. See Repertory of Arts, vol. 7 (*third series*), p. 16; London Journal (*Newton's*), vol. 14, p. 240; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 476.]

A.D. 1825, November 7.—N° 5280.

HUNTER, GEORGE.—This invention relates to the wheels of carriages for common roads and railways, and consists in "the construction and adaptation of one, two, three, or more wheels to act within a rim or fellow of a wheel, forming a moving railway for the said inner wheel or wheels." On the axle of the carriage is mounted a small wheel, named the "action wheel;" and this wheel travels upon the inner surface of an annular rim or ring, which runs upon the road or on the rails of a railway, and is called the "road wheel;" the whole being termed the "moving railway wheel." The action wheel may be made with a groove around its periphery, to receive a rib on the inner surface of the road wheel; or it may be made with a smooth edge, and travel in

a groove or hollow, formed by affixing two flanges or flat rings to the inner surface of the road wheel. "Guard wheels" may be employed to prevent the action wheel being displaced from the road wheel by any sudden jerk, and to steady the motion of the latter wheel. These guard wheels are similar to the action wheel, but of smaller diameter, and rotate in contact with the inner surface of the road wheel; their axles being carried by the raised ends of a frame through which the axle of the action wheel passes. "These moving railway wheels may be made with teeth or cogs." The road wheel may be enlarged to any size or breadth without increasing the size of the action wheel.

[Printed, 10d. See Repertory of Arts, vol. 6 (*third series*), p. 436; London Journal (*Newton's*), vol. 13, p. 85; Engineers and Mechanics' Encyclopædia, vol. 2, p. 536; and Rolls Chapel Reports, 7th Report, p. 126.]

A.D. 1827, January 15.—N° 5450.

NEVILLE, JAMES.—Improved steam carriage for running on common roads. The driving wheels have iron tires from five to six inches wide; and, in order to increase the propelling power, rows of steel studs, rivets, or buttons are let into the tires, and project therefrom about one-fourth of an inch. When the steam carriage is intended to run up very steep hills, elastic steel plates, about eighteen inches long and of the same width as the tire, are to be attached to the peripheries of the driving wheels. These plates are to have their outer surface made sufficiently rough by projecting steel studs, or by any other means; and they are to be affixed at one end to the tire by countersunk screws, so that, when not compressed, they will form tangents to the circumference of the wheel. The elasticity of the steel plates will enable them to assume the circular form of the tire as they ascend with the wheel from the ground; at the same time their extended surface will occasion greater resistance, and prevent the wheels from slipping when ascending steep hills.

[Printed, 10d. See London Journal (*Newton's*), vol. 2 (*second series*), p. 326; Register of Arts and Sciences, vol. 3 (*new series*), p. 330; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 479.]

A.D. 1829, July 4.—N° 5808.

CRABTREE, ROBERT.—"Machine or apparatus which is put "in motion by means of a pendulum or lever acting upon two "lever chains or system of levers, commonly called lazy tongs,

“ which, by their alternate expansive and contractive motion in
 “ propelling weights to and upon a main beam, balance, or lever,
 “ act by means of crank rods upon the cranks of paddle wheels
 “ in relation to vessels, and upon common wheels in relation to
 “ carriages, and also by means of propellers in relation both to
 “ vessels and carriages, thereby producing progressive motion.”
 These propellers are legs, the upper ends whereof turn upon bolts
 on the main lever; and the lower ends, which are furnished with
 spiked feet, act against the bottom of a canal or river, when
 applied to a vessel, or against the surface of a road when used for
 impelling a carriage.

[Printed, 9d. See London Journal (*Newton's*), vol. 6 (*second series*),
 p. 246; Engineers and Mechanics' Encyclopædia, vol. 2, p. 523; and
 Rolls Chapel Reports, 7th Report, p. 130.]

A.D. 1829, July 25.—N^o 5819.

QUETIN, LOUIS (*a communication*).—Improved vehicle or combination of vehicles, entirely supported by a single broad wheel of large diameter, situated in the centre of the space between several coach bodies, magazines, or boots, intended to contain passengers and luggage or goods; and which bodies are combined together by peculiar mechanism, so as all to hang on a framework supported by two pivots, one at each end of the axle of the large single wheel. To prevent any chance of overturning, four small rollers or wheels are provided, one at each of the angles of the above-named framework. None of these rollers touch the ground when the great wheel is vertical, or nearly so; but whenever the wheel is caused by any obstacle to incline over considerably to one side, the rollers on that side will come in contact with the ground, and prevent so much inclination as would endanger the overturning of the vehicle. The rollers are connected to the framework by springs, which yield when the rollers touch the ground, so as to avoid any shock or concussion; and by the reaction of these springs the wheel is afterwards restored to the vertical position.

The improved vehicle may be made with only one body, suspended concentrically with and occupying the interior of the wheel, which, in that case, can have no spokes or nave, but must be only a circular ring, having a cage or lantern framework fixed therein. The body is suspended in this cage upon centre pins, concentric with the rim of the wheel; and the body being made

heaviest on one side will always hang the same way upwards within the cage, when the latter is rolling round as the wheel advances along the road.

Or the improved vehicle may consist of two distinct bodies, suspended and equally poised at the ends of the axis of a central wheel, which is made with spokes and a central nave.

[Printed, 2s. 4d. See London Journal (*Newton's*), vol. 9 (*second series*), p. 181.]

A.D. 1830, July 1.—N^o 5950.

CLIVE, JOHN HENRY.—This invention relates to locomotive engines or machines for drawing ploughs, harrows, or other machines and carriages.

1. Employing wheels (or shapes having in action the effect of wheels) of larger diameter than those heretofore used.

2. Applying the power of the engine or engines to such wheels at a greater distance from the centre or axis thereof than has hitherto been the practice.

3. In cases where the locomotive engine or machine is required to be steered along a curved course, placing a broad wheel at the middle of the breadth of the machine so as to bear the principal part of the weight, and communicating the power of the engine thereto. The carriage of the engine is also provided with a pair of fore wheels, the axletree whereof can be turned around an upright perch bolt by the steersman, and with a pair of hind wheels turning on an axletree connected to the carriage by springs; but these wheels bear only a small portion of the weight of the machine,

[Printed 4d. See London Journal (*Newton's*), vol. 1 (*conjoined series*), p. 256; Register of Arts and Sciences, vol. 8 (*new series*), p. 259; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 522.]

A.D. 1830, November 4.—N^o 6030.

GILLET, AUGUSTUS WHITING (*a communication from George Bridgman*).—"This improvement in the construction and application of wheels to carriages of pleasure or of burden, or to machines for moving heavy bodies, consists in the adaptation of what may be called a perpetual railway to carriages of different kinds, which is formed by a circular rib or rail placed round the interior of the felloe of the wheel, and upon which circular rib a small wheel with a grooved periphery is intended to run;

"which small wheel, bearing its portion of the burthen of the carriage, by running upon a smooth even surface greatly facilitates the progress of the carriage when the larger or running wheel passes over heavy or uneven ground."

[Printed, 8d. See Repertory of Arts, vol. 11 (*third series*), p. 126; London Journal (*Newton's*), vol. 6 (*second series*), p. 265; Register of Arts and Sciences, vol. 5 (*new series*), p. 263; Engineers and Mechanics' Encyclopædia, vol. 2, p. 535; and Rolls Chapel Reports, 7th Report, p. 133.]

A.D. 1832, February 9.—N° 6220.

CHURCH, WILLIAM.—In this Specification the patentee describes a running wheel of peculiar construction for steam carriages intended to run on common roads. It is of considerable breadth and of large diameter. The fellow is composed of several hoops of elastic wood, secured together by clamps; the periphery of the wheel is bound by a hoop of iron, forming a tire; and the spokes consist of elastic curved plates of steel, bending and moving upon joints. The outer ends of the elastic spokes are attached to the fellow by joints on the backs of the clamps; and the reverse ends are connected by joints to a pair of metal rings fixed by radial and diagonal rods to the nave of the wheel. The wheel is fixed upon a short rotary axle; and the weight of the carriage bearing upon this axle causes the periphery of the wheel to bend into a slightly oblate figure or flattened curve as it passes over the road. This deviation from the circular figure of the wheel, by its increased surface, causes the wheel to take more firm hold of the ground, and consequently to be less liable to slip round or sink into the road.

[Printed, 4s. 4d. See London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 89; Mechanics' Magazine, vol. 20, p. 49; Register of Arts and Sciences, vol. 7 (*new series*), p. 231; Engineers and Mechanics' Encyclopædia, vol. 2, p. 459; and Rolls' Chapel Reports, 7th Report, p. 138.]

A.D. 1832, May 15.—N° 6267.

HEATHCOAT, JOHN.—The principal object of this invention is to cultivate soft, swampy, boggy, or unstable land; and for this purpose the patentee employs a steam engine or other motive power machine instead of horses or other animals. The engine is attached to a large carriage, mounted on a series of wheels which conduct a broad endless flexible floor, railroad, or way, within and upon which the carriage is caused to travel by the power of the

engine. By means of ropes, bands, or chains, connected with winding gear worked by the engine, and passing round a wheel, pulley, or barrel on auxiliary carriages (placed on each side of the principal carriage, at a distance therefrom), the ploughs or other implements are drawn to and fro across the land.

When the land is more firm, the carriage is to be mounted on broad rollers or drums.

[Printed, 2s. 3d. See London Journal (*Newton's*), vol. 8 (*conjoined series*), p. 329; and Rolls Chapel Reports, 7th Report, p. 144.]

A.D. 1834, December 23.—N° 6733.

HANSOM, JOSEPH.—This Specification contains the description of a carriage of improved construction, in which, instead of wheels of the ordinary form, with felloes, naves, and spokes, placed externally to the body of the carriage, the rotary action is produced by means of rings or zones, with friction rollers or other equivalent rotary agents working therein,—such rings or zones girdling or circumscribing the body of the carriage at points more or less removed inwards from the outer sides of the body. The carriage is encircled by two large rings, placed parallel to each other, and rolling along the road as the vehicle is drawn onward. Four transoms or beams are affixed to the carriage, and extend across from one ring to the other. Two of the transoms are placed beneath the seats, and the remaining two are fixed at the top of the carriage body. The transoms carry at each end a friction roller, which rotates in contact with the inner surface of the ring (in like manner to a wheel upon a circular railway), and also a pair of guides, one on each side of the ring. The friction rollers support the weight of the carriage, and serve, together with the guides, to retain the rings and carriage body in their proper positions.

[Printed, 1s. 3d. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 56.]

A.D. 1835, March 16.—N° 6791.

CHURCH, WILLIAM.—This invention includes a method of facilitating the ascent of inclined planes on railways by the addition to locomotive engines of small wheels with broad rims or tires, affixed to the outer sides of the ordinary wheels or upon the *same shaft or axes*; which wheels are intended to travel upon

raised tracks or ways of stone or other suitable material, situated outside the ordinary rails, "and by their being of smaller diameter, they enable the engines to ascend the incline with less difficulty and without changing their speed of working; and if it should be thought desirable, the smaller wheels may be formed with a rim of cogs or teeth, taking into a rack fixed upon the raised tracks, but allowing the periphery of the smaller wheels to run upon the surface of the stone or iron work." The lower ends of the tracks are formed with inclines, so that the small wheels meet with the tracks and raise the large running wheels off the rails without any sudden jerk; and they leave the upper ends of the tracks by other inclines, which let the large running wheels gently down upon the iron rails, when the engine has ascended the inclined plane.

[Printed, 8s. See London Journal (*Newton's*), vol. 9 (*conjoined series*), pp. 257 and 313; and Rolls Chapel Reports, 7th Report, p. 160.]

A.D. 1836, January 19.—N° 6984.

HARSLEBEN, CHARLES.—Propelling carriages or vessels by the power of horses or other animals, or of men, exerted upon a moveable flexible platform, which is thereby caused to travel around two supporting rollers, and by means of fixed bars on its inner surface, gearing like cogs into the teeth of a pinion or wheel, to give motion to the main or driving shaft of the carriage or vessel.

A "friction wheel" for carriages, the periphery whereof admits of change of form by pressure, so that under certain circumstances, by flattening the curve, a much more extended contact with the ground is obtained, and consequently more hold to assist the ascent of the carriage up an inclined plane. This wheel is not employed as the bearing wheel of the carriage, but as a supernumerary wheel, fixed on a prolongation of the axle, to act upon the ground on the outside of the rail. The spokes of the wheel are hollow, and the tire is made in as many flexible segments as there are spokes. Each segment is fixed at the centre to a rod, which fits loosely in the corresponding spoke; and a helical spring is inserted in the hollow spoke, between the end of the rod and the nave. The segments are also connected near the ends, by stretchers, with the sides of the hollow spokes. As each segment is brought in contact with the ground by the rotation of the wheel, the rod

is permitted by the spring to slide inwards, but the stretchers being unyielding, flatten the curve of the flexible segment, and bring its surface into more extensive contact with the ground.

To lessen retardation from atmospheric resistance when a carriage is moving with great velocity, it is proposed to fix a semi-cylindrical screen on the leading end of the carriage.

[Printed, 1s. 6d.]

A.D. 1836, May 13.—N° 7093.

ASHDOWNE, JOHN.—Facilitating the draught of carts, wag-gons, or other carriages on turnpike or common roads, by applying an endless chain around each wheel thereof. The chain is composed of short iron bars, connected together by pin joints, and is made to pass around the wheel and over a lever guide, suspended in front of the wheel. The lever guide serves to extend the chain, and to cause it to assume such a position before the wheel, as it falls on the road, that the upper part of the bars whereof the chain is formed shall offer a hard surface for the wheel to run upon, in like manner to a wheel moving on a fixed railway. As the wheel rolls onward, a fresh portion of the chain comes under the wheel, and that part which has performed its office passes up with the ascending portion of the tire.

[Printed, 6d. See Repertory of Arts, vol. 7 (*new series*), p. 77 ; and London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 145.]

A.D. 1836, May 17.—N° 7097.

WOOD, HENRY WALKER.—The object of this invention is to facilitate the ascent and descent of railway inclines. To the inner side of each rail is fixed a toothed rail or rack, the teeth whereof project above the upper surface of the ordinary rail ; there being a groove between the upper surfaces of the two rails, to permit the flanges of the carriage wheels to pass. Upon the driving axle or axles of the locomotive engine, close to the inner side of each driving wheel, is fixed a toothed wheel, which is intended to gear into the teeth of the toothed rail, but is so much smaller in diameter than the driving wheel, that the latter, as it travels along the smooth rail, will continue to bear the weight of the engine ; the toothed wheel having only a propulsive action.

[Printed, 4d.]

A.D. 1836, June 13.—N° 7118.

VAUX, THOMAS.—The subject of this invention is a revolving harrow. In the drawing attached to the Specification, the framing is shown supported behind by two narrow wheels, and in front by a pair of broad wheels or rollers; and the patentee states that the latter are intended to be more or less broad according to the state of the land.

[Printed, 8d. See Repertory of Arts, vol. 8 (*new series*), p. 215; and London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 90.]

A.D. 1837, April 25.—N° 7351.

CAYLEY, Sir GEORGE.—In a communication from the patentee, which appeared in the *Mechanics' Magazine* of May 7, 1831, vol. 15, at page 149, there is the following description of an improvement in railway wheels, designed to reduce the wear, but which would also serve to increase the bite upon the rails:—"If the wear and tear of railway conveyance be found too expensive, owing to the friction caused by such high pressure and great velocity, and that the use of springs to these carriages are not sufficient to remedy this evil, I think it probable that a dove-tailed groove, filled with hard oak, driven in in small pieces endwise, within the rim of the wheels, and then turned in a lathe till circular, might be serviceable, and could be cheaply renewed; these pieces might be secured in their bed by a fox-wedge, as commonly practised in similar cases."

The Specification now under notice contains a description of an improvement upon the above-mentioned wheel. In this case the wheel is made with a deep flange, and to the opposite side of the tire is secured a ring or annular plate of less depth than the flange. The space between the flange and ring is occupied by "a filling-up of hoof, of horn, of tough woods, or of other partially elastic substances suitable for giving a slight degree of elasticity to the periphery for diminishing the effects of percussion." The filling-up material is turned down (slightly conical) to the outer edge of the ring, so as to leave the flange projecting beyond the periphery of the wheel to the usual extent.

[Printed, 8d. See Repertory of Arts, vol. 9 (*new series*), p. 21.]

A.D. 1837, May 11.—N^o 7370.

BOYDELL, JAMES.—Propelling carriages by levers or legs actuated by a revolving shaft. The levers or legs are connected at their upper ends to separate cranks on a horizontal shaft, which turns in bearings at the top of a pair of high standards, fixed on the rear end of a locomotive engine or steam carriage. On the shaft being caused to rotate by the power of the engine, the levers or legs are successively drawn forward and caused to act against the ground, so as to push the carriage onward. In place of the propelling power being steam, the revolving shaft may be turned by manual labour or other power.

[Printed, 8d. See Repertory of Arts, vol. 9 (*new series*), p. 12.]

A.D. 1833, November 8.—N^o 7866.

WINROW, JOHN.—Apparatus for destroying weeds and insects on land. In the drawings attached to this Specification the running wheels of one arrangement of apparatus are represented with projections or teeth around their peripheries, to give them a firm hold upon the ground.

[Printed, 1s. 6d. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 353.]

A.D. 1839, March 6.—N^o 7993.

CLARK, JOHN.—“A new or improved form or construction of
“a leg and foot for propelling carriages on rail or common roads;
“and a new combination or arrangement of machinery for locomotive carriages, by means whereof the weight of the load to be
“carried is rendered applicable as part of the power for moving
“or propelling the carriage on which it is supported or rests.”
Two frames or carriages are employed; the first, or No. 1, is supported by three pairs of running wheels, and carries two transverse horizontal shafts (one at its foremost end, and the other near its hind end), each having eight cranks or eccentrics, to which the like number of impelling legs are connected. The second, or No. 2, consists of a strong framework for the support of a coach, cart, waggon, or any description of carriage, and is furnished with four wheels, which are enclosed in and supported by four cylinders, affixed to the ends of the two shafts which actuate the impelling legs. These legs are formed with knee joints in the lower parts

thereof, and also with ankle joints at the bottom, whereby they are connected to the feet, which are provided with springs on the under side of the soles.

“To cause this united machine to advance, the four wheels attached to the framework of carriage Number 2 are, by the aid of a steam engine, made to revolve in the cylinders in a backward direction to the carriage Number 1, to which these cylinders are attached; and thus these wheels belonging to the carriage Number 2 are by the rotatory motion communicated by the steam engine, as hereafter described, continuously attempting to advance; but immediately that they are propelled or removed from the points on which they rested, their weight, with the load they support, is brought to press on the inner circumference of the cylinders, at points removed from the centre of gravity of the said cylinders; and consequently as the wheels of the carriage Number 2 have trundles and cogs running on rims and cogs forming the inner part of the cylinders, as will be hereafter more fully described, the weight of the carriage Number 2, thus applied, must give to the cylinders a rotatory motion; or the resistance by which they are withheld must be equal to or superior to the powerful revolving force exerted by the wheels of the said carriage Number 2 running therein. By this adaptation of the carriages Numbers 1 and 2, the cylinders become a sort of endless railway, constantly descending or turning as the weight revolving therein is more or less removed from their centre of gravity, in proportion as the resistance to be overcome may require.

“The weight thus applied to the cylindrical wheels is also brought to act on the legs, which being attached to the cranks or eccentrics on the same shaft, in manner as will be hereafter described, are consequently, as the cylindrical wheels revolve, pressed alternately at different angles against the ground in a line to push and cause the road wheels of carriage Number 1 to revolve in a forward direction.”

[Printed, 1s. 9d. See *Inventor's Advocate*, vol. 1, p. 67.]

A.D. 1839, August 26.—N^o 8207.

PINKUS, HENRY.—This Specification includes the description of certain locomotive engines, to be worked by “pneumatic atmospheric auxiliary power” and “gasopneumatic power,” for giving

motion to agricultural implements and carriages. In order that the wheels may take a firm hold of the ground, studs of a tapering form, four inches high, and of the same width as the wheel, are fixed around the tire. To prevent the engine from sinking in marshy or boggy lands, a metal rim (say twelve inches wide) may be bolted on the periphery of each wheel; and an endless apron of coarse mesh wire gauze may be stretched around the fore and hind wheels on each side of the engine; when the machine is in action, the apron will move round with the wheels, which will run upon it.

[Printed, 4s. 2d. See *Inventor's Advocate*, vol. 2, p. 195.]

A.D. 1840, January 1.—N° 8331.

NICOLAS, JOHN LEO.—1. Applying pendent levers or legs to a locomotive engine or carriage, in order to propel the same in certain situations where the usual driving wheels would be found partly or wholly ineffectual, such as up very steep acclivities, over newly-made roads or ploughed lands, and through fields whose surface is uneven and is always slippery in wet weather. Each leg has a foot or shoe at the lower end thereof, and is suspended from the forward end of a lever, which is weighted at the hind end, and turns freely on a horizontal axis near its centre. The legs are successively pressed downward and backward against the ground by radial arms on a horizontal revolving shaft; and as each arm ceases to act on its leg, that leg is raised by the weight just mentioned, and carried forward by the carriage until it is again depressed.

2. "The second part of my improvements are intended to apply
 "only in marshy and boggy situations, where wheels would sink
 "into the soil and could not be propelled. This improvement,
 "which I intend to use in conjunction with the before-described
 "arrangements for propelling, is a kind of moveable and portable
 "railway or road, which is laid down, travelled over, taken up,
 "and carried by the machine itself. It consists of a number of
 "boards with raised sides, and having their upper surface rough-
 "ened for the purpose of giving the feet or shoes of the pendant
 "arms, before described, a good hold, in order that the carriage
 "may be propelled. These boards, after being used for support-
 "ing the pendant levers, are raised from the ground by a peculiarly-
 "shaped compound lever, and are carried forwards to the front of

“ the machine by means of a travelling endless cloth, furnished
 “ with hooks, and passed over rollers, one of which is situated at
 “ the front part and the other at the back part of the machine.
 “ The boards brought forward in this manner are to be lowered in
 “ front of the carriage by means of a compound lever, similar to
 “ the one employed for raising them from the ground. At the
 “ time that the lower ends of the pendant wheels are acting against
 “ any particular board, the running wheels of the carriage are
 “ passing over that board, which is thereby prevented from slipping
 “ away.”

3. Rotary engine, to be worked by steam, air, gas, or other fluid.

[Printed, 1s. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 76; and *Inventor's Advocate*, vol. 3, p. 20.]

A.D. 1840, September 24.—No 8644.

PINKUS, HENRY.—This invention consists partly in working agricultural implements by electricity. The wheels of the locomotive engines employed for this purpose have studs or projections around their tires, to give them a firm hold of the ground, like those described at No. 8207.

[Printed, 6s. 8d. See *Mechanics' Magazine*, vol. 34, p. 299; *Inventor's Advocate*, vol. 4, p. 213; and *Engineers and Architects' Journal*, vol. 4, p. 174.]

A.D. 1841, November 9.—No 9143.

DAVIES, HENRY.—One part of this invention relates to an arrangement of machinery for effecting the locomotion of carriages. “ This arrangement consists of certain machinery attached to a
 “ carriage, by which the carriage and machinery are supported on
 “ certain levers or legs; which levers or legs perform the functions
 “ of wheels in ordinary wheel carriages; these functions being per-
 “ formed by the vibration of the levers or legs on which the weight is
 “ supported. This arrangement being capable of employment either
 “ by means of animal power applied to draw forward the carriage,
 “ and consequently produce the vibrating motion of the supporting
 “ levers or legs, or by means of mechanical power contained within
 “ the carriage; which mechanical power is then applied directly to
 “ communicate the vibrating motion to the supporting levers or
 “ legs; in which case the levers or legs act as propellers to the
 “ carriage, as well as supporters of its weight.”

[Printed, 2s.]

A.D. 1842, September 16.—N° 9473.

JAMES, WILLIAM HENRY.—In this Specification the patentee proposes to apply rollers (mounted upon suitable axles) as substitutes for the wheels of carriages intended to travel upon elevated railways or carriage ways. He also describes the following mode of adapting an endless chain or series of rollers to such carriages. The carriage frame is formed with a horizontal platform underneath, nearly as long as the carriage, and of sufficient strength to bear the same when resting upon rollers beneath. “The upper surface of this horizontal platform is made concave, and its ends semicylindrical, to allow of a series of rollers, connected together at their axles by endless chains *c, c*, hanging over the same, after being made to pass underneath and around the semicylindrical ends of the platform, so that the weight of the rollers shall at all times tend to keep the chains sufficiently tense to retain them in their proper position; or the upper surface may be made slightly convex, but elastic, by means of springs, so as to produce a similar effect of tightening the chain of rollers.” From the centres of the semicylindrical ends of the platform, at each side, short axles project, and carry guide wheels, which have semicircular cavities in their peripheries at suitable distances apart to receive the axles of the rollers, so that after the rollers have passed underneath the horizontal platform, and as they roll over the semicylindrical ends thereof, their axles may enter the semicircular cavities of the guide wheels, which tend to keep the chains and rollers in their proper position.

[Printed, 1s. 8d.]

A.D. 1843, July 3.—N° 9812.

PHILLIPS, CHARLES.—This Specification contains the description of a reaping machine, which is mounted on two wheels. The near-side wheel turns freely on the axle, but the off-side wheel is fixed to the axle, and is furnished with spikes around its periphery, which enter the earth and ensure the rotation of the wheel and axle as the machine progresses. From the axle motion is transmitted to the operating parts of the machine.

[Printed, 1s. 5½d. See *Mechanics' Magazine*, vol. 40, p. 271; and *Engineers and Architects' Journal*, vol. 7, p. 153.]

A.D. 1845, January 21.—N° 10,483. .

SELLER, JOHN.—Machine for drain cutting and subsoiling, having four running wheels. Around the two wheels on each side of the machine an endless chain passes, forming a continuous metal track beneath the wheels; each wheel is furnished with small spikes on its periphery to enter the links of the chain; and the chain is made with projections on the outside, which penetrate the earth and prevent slipping.

[Printed, 8d.]

A.D. 1845, March 27.—N° 10,578.

**TEISSIER, BAPTISTE SIMION, and TRIAT, ANTOINE HIPPO-
LYTE.**—1. Propelling vessels by vibrating paddles at the stern.

2. Impelling locomotive engines and steam carriages by means of legs or "paws," each suspended from a separate crank upon two crank axles (one behind and the other in front of the vehicle), so that as the axles are caused to rotate by the power of the engine, the legs will successively act against the ground, and push forward the locomotive engine or steam carriage.

3. Employing a similar arrangement of legs or paws to propel agricultural implements. A machine for ploughing upon this plan is represented. It consists of a three-wheel carriage, having at the back (or at the front, if preferred) a crank axle, with the legs connected thereto; and behind the legs there is a set of eight ploughs, connected to the carriage in such manner as to work in a diagonal line. The crank axle may be caused to rotate by any a suitable power, in order to give motion to the legs.

[Printed, 1s.]

A.D. 1845, May 8.—N° 10,660.

BEAUMONT, GEORGE DUCKETT BARKER.—Apparatus for effecting or facilitating the propulsion of carriages. A horizontal axis, mounted in the carriage framing, has a series of arms projecting radially therefrom. Each arm is composed of two parts; the outer portion being formed into a socket, so as to be capable of sliding upon the end of the other part, which is attached to the axis; and to this outer part or socket a block is connected by a pivot. Motion is communicated from a steam engine or other prime mover to the horizontal axis, by the rotation whereof the

blocks are successively brought to the ground, and serve to carry forward the carriage. The weight of the carriage is supported by these blocks through the medium of friction wheels, mounted in a frame connected by springs with the carriage framing, and bearing on those blocks which are upon the ground,—the power of extension possessed by the radial arms admitting of several blocks being always in contact with the ground. The system of arms may be either used in pairs or singly in a frame or carriage.

An arrangement of apparatus for working on a rail or smooth path is also described. In this instance, the blocks, instead of being attached to radial arms, are chained together, so as to form an endless series, and pass around a curved frame fixed to the carriage framing. The blocks are formed with teeth or racks at the back, and a toothed wheel, driven by a steam engine or other prime mover, gears into such racks, in order to impel the carriage.

[Printed, 6d.]

A.D. 1845, June 3.—N° 10,705.

BRENT, WILLIAM BRENT.—“Machinery for cutting or excavating and removing earth,” mounted on four rollers or broad wheels.

[Printed, 6d.]

A.D. 1845, July 12.—N° 10,761.

TEMPLETON, JOHN SAMUEL.—Part of this invention consists in providing a locomotive engine with a screw, to work in grips, points, or notches, fixed in the ground along the centre of the line of railway, for the purpose of facilitating the propulsion of railway carriages, and particularly for surmounting steep gradients. The screw is placed horizontally beneath the locomotive engine, in a direction parallel to the rails, and about midway between them. It is caused to revolve by the power of the engines, which are to be disconnected from the driving wheels when the screw is in action.

[Printed, 1s. 4d. See Repertory of Arts, vol. 7 (*enlarged series*), p. 142.]

A.D. 1845, July 29.—N° 10,789.

BEADON, GEORGE.—This Specification includes the description of a common road steam carriage, which does not travel upon

wheels, but upon substitutes for wheels, "combining the direct "action of the rotary wheel with the oblique action of the screw." These are fixed upon two axles, extending horizontally from the front to the back of the carriage frame, and having cranks in the middle of their length, connected by rods with a cross-head on the upper end of a piston rod, which works through the top of an upright steam cylinder, fixed in the middle of the frame.

The substitutes for wheels each consist of a helical frame, attached to the axle by spokes or stays; in this frame, from one end to the other, openings are made at equal distances apart for the reception of small wheels or rollers; and a pin is inserted in the frame, across the middle of each opening, to serve as the axis of the wheel or roller. The frame may be therefore described as a skeleton screw, with a series of wheels or rollers partly projecting from the edge of the thread and parallel to the sides thereof, the lowermost resting on the ground and supporting the weight of the carriage. When the helical frames are caused to revolve, each roller in succession comes in contact with the ground, and travels for a few moments thereon in a direction obliquely to the line of motion of the carriage; and the helical frames thus act in the manner of screws to impel the carriage which they support.

Instead of open helical frames, close drums may be employed, having the small wheels or rollers mounted in their peripheries at such angles that a line drawn continuously through them would describe the course of a thread winding helically around the drum.

[Printed, 2s. See *Mechanics' Magazine*, vol. 44, pp. 104 and 113, and vol. 45, pp. 205 and 406.]

A.D. 1845, July 29.—N° 10,790.

BROWN, Sir SAMUEL.—The patentee proposes to convey ships, barges, and other vessels on a tram-road by means of an endless chain of rollers, working around a long frame or cradle, which carries the vessel, and is supported by the rollers. The apparatus is to be drawn by locomotive engines travelling on suitable rails.

[Printed, 1s. 1d.]

A.D. 1845, July 30.—N° 10,792.

COLEMAN, EZRA.—"Improvements applicable to moving locomotive engines on inclined planes of railways." Beneath the locomotive engine there is an "endless screw," fixed on a hori-

zontal shaft, which extends lengthwise of the engine, and can be caused to rotate by gearing from the driving shaft. Along the middle of each track or line of rails upon the inclined plane there is a long row of friction rollers, "arranged at such equal distances from each other that the thread of the endless screw, as it revolves, will work freely into the spaces between them, as into the groove of a female screw." Between the driving wheels there are two wheels of somewhat smaller diameter, which play loosely upon the driving shaft, and, on arriving at the incline, they run upon an inner track of rails elevated above the ordinary rails, so as to lift the driving wheels out of action; "or other means may be resorted to for applying the whole of the power to the axis of the screw."

[Printed, 5d. See Repertory of Arts, vol. 7 (*enlarged series*), p. 140.]

A.D. 1845, December 10.—N^o 10,990.

THOMSON, ROBERT WILLIAM. — "Application of elastic bearings round the tires of the wheels of carriages for the purpose of lessening the power required to draw the carriages rendering their motion easier, and diminishing the noise they make when in motion. I prefer employing for the purpose a hollow belt composed of some air and water tight material, such as caoutchouc or gutta-percha, and inflating it with air, whereby the wheels will, in every part of their revolution, present a cushion of air to the ground, or rail, or track on which they run." The belt, when not subjected to pressure, is of less breadth than the tire, which is made much broader than usual; but that portion of the belt, which is for the time in contact with the ground, is extended laterally by the pressure to the same breadth as the tire, and the periphery of the wheel being thereby flattened at that part, presents a more extensive surface to the ground. These wheels may be used with advantage on timber railways; in which case they are to be made without flanges,—the carriages being kept on the rails by guide wheels acting against a central rail. To increase the bite of the driving wheels of the locomotive engine, rivets with sharp conical heads are inserted in the outer cover of the elastic belt.

Similar elastic bearings may be applied to the surfaces of other rolling bodies.

[Printed, 1s. See *Mechanics' Magazine*, vol. 46, p. 289; and *Patent Journal*, vol. 1, p. 61.]

A.D. 1846, January 3.—N° 11,024.

SWINBURNE, THOMAS.—This invention relates principally to atmospheric railways, but the patentee describes a carriage to be used on railways of all descriptions, and on common roads. The carriage consists of a hollow cylinder, having at each end a broad flanged rim, similar to that of the ordinary railway wheel, and intended to travel in like manner on the rails. From each end of the cylinder a short axle projects for the purpose of receiving the end of a link bar, which serves to connect it with the axle of the next carriage; and thus all the carriages are connected together, forming a chain or series of rolling cylinders. When the carriage is to be used on common roads, cylindrical caps are fastened over the rims, so as to present a plain surface to the ground.

Carriages of like form, but without rims, are to be employed for rapid conveyance, especially of goods, letters, &c.,—the train of carriages being impelled through a series of short discontinuous tubes by atmospheric pressure.

[Printed, 10d. See *Mechanics' Magazine*, vol. 45, p. 193; and *Patent Journal*, vol. 1, p. 292.]

A.D. 1846, January 15.—N° 11,040.

LEAHY, EDMUND.—“Adaptation of a series of short rails to the wheels of carriages, which rails are arranged and linked together in a manner somewhat resembling an endless chain. The carriage, by means of these rails, may be drawn or propelled by animal, or steam, or other power; and each wheel will always bear upon at least one of the rails or links of the chain with which it is, as it were, encircled. The chain of rails may be sustained upon the periphery of the wheels, or upon rollers attached to the carriage and arranged around the circumference of the wheel or wheels; or, if preferred, large rollers, having their bearings in the framing of the carriage, may be placed in front and rear of the carriage wheels to support the chains of rails, and guide them under and over the carrying wheels as the carriage is drawn or propelled forward.” “According as the wheel has passed over one link or rail, it is taken up behind by the rotary motion of the wheel, and another is at the same time dropped down in front, which, resting on the ground, alike to the former, the wheel rolls over it in like manner, and so on; each link or rail being successively brought under the wheel,

“remains stationary on the ground whilst the wheel is passing over it, and produces the same effect as a continued line of rail—way or tramway, made with edge rails or plate rails, each equal in length to a link in my circumscribing chain of rails.” To prevent any considerable friction of the chains while travelling around the carriage wheels, the links or rails are provided with elastic friction rollers to bear upon the periphery of the wheels; or instead of these rollers being elastic, an elastic band is attached to the periphery of the wheels.

[Printed 1s. 10d.]

A.D. 1846, February 19.—N° 11,099.

NISBET, ROBERT.—Making such additions to locomotive engines and railways that an engine may be propelled up an inclined plane at a considerable velocity, or correspondingly retarded in its descent. A ring or circle of strong teeth is to be attached to each side or to one side only of each driving wheel of the engine; and the teeth of these rings are to take into the teeth of racks or rack bars, laid down along one or both of the sides of each line of rails, wherever there is an ascending gradient. The toothed rings serve only to propel the engine, and do not bear any part of its weight.

“On lines where there are numerous crossings it will be proper to have the toothed circles on the inner or flange side only of the wheel, for where there is room for the flanges to pass there will be room for the toothed circles to pass, or at least room for them to pass freely can be readily made. All chance however of the toothed circles interfering in any way with the progress of the wheels, when out of gear with the racks, may be obviated by attaching them to the driving wheel in such manner that they may be raised occasionally into a plane an inch or two higher than that of the rails.” In the arrangement represented the toothed circle is connected with the driving wheel by three links, each link consisting of a short bar, which turns freely on two centres or pins, one carried by the wheel and the other by the ring.

[Printed, 10d. See *Mechanics' Magazine*, vol. 45, p. 554; *Patent Journal*, vol. 1, p. 230; and *Engineers and Architects' Journal*, vol. 9, p. 321.]

A.D. 1846, February 27.—N° 11,114.

TEMPLETON, JOHN SAMUEL.—This invention relates to the *propulsion of carriages and vessels*. It includes, amongst other

improvements, three modes of applying friction rollers in connexion with screws attached to locomotive engines and carriages, for the purpose of propelling the same on railways. In the first plan a horizontal cylinder is supported by the locomotive engine in a direction parallel to the rails. This cylinder carries a number of small rollers, placed with one of their flat sides turned to its convex surface, and arranged so as to form a regular helix ; and when the cylinder is caused to rotate by the power of the engine, these rollers bear against and roll upon short upright bars or plates, fixed obliquely across the centre line of the railway, and so impel the engine. In the second mode the rollers are placed radially to the axis of the cylinder, and act by their bevelled edges on the bars. According to the third method the rollers are supported in a vertical position, parallel to the rails, by stationary grips or bars, affixed to a longitudinal sleeper ; and a screw, carried by the locomotive engine, is made to act on the rollers.

Assisting engines up inclines by causing legs or bars, worked by eccentrics to act against a notched rail or rack bar, fixed in the centre of the track.

Increasing the bite or adhesion of the driving wheels of locomotive engines on the rails, by bevelling the outer edge of the rail, and making the tire of the wheel with an angular groove therein, so as to enable it to grip the rail.

Applying india-rubber or gutta-percha to the driving wheels of locomotive engines, in order that a firmer hold of the rail may be obtained, especially in ascending inclined planes. The tire of the wheel is formed with dovetail recesses, into which the strips or blocks of india-rubber or gutta-percha are tightly driven, and they may be also secured therein by cement, or by bolts and nuts.

[Printed, 7s. 8d.]

A.D. 1846, August 29.—N° 11,357.

BOYDELL, JAMES.—“ Mode of applying moveable detached
 “ parts of a railway to the wheels of carriages, whereby each part
 “ is successively placed by its wheel in the road or land over
 “ which the carriage is to pass ; each piece of the railway, when
 “ down, allowing its wheel to roll over it ; and the wheel lifts the
 “ pieces of the railway successively, and holds each piece in such
 “ position as to deposit it correctly when that part of the wheel
 “ which carries a part of the railway again comes near the earth :

“ by which means a railway will continuously be formed and broken up as the carriage is drawn along on a road or over land, “ by which the power required to draw a given load will be “ reduced.” Two short arms project from the middle of each detached part or rail (forming a right angle therewith) and carry two pins, which work in two slots of a horse-shoe shape, formed in pieces of iron affixed to the felloe of the wheel ; or there may be only one slot, receiving a single pin, which connects the two short arms together. This mode of attaching the rails admits of the above-described movements taking place,—each rail being steadied in its different positions by three cogs, which project from the periphery of the wheel, and enter notches made at the middle of the rail and near each end thereof.

[Printed, 6d. See Patent Journal, vol. 2, p. 698.]

A.D. 1846, September 17.—Nº 11,373.

WRIGG, HENRY, (*partly a communication from William Hersall Wrigg*).—“ Consists in diminishing draught and friction “ in carriages and other conveyances by constructing every description of carriage in such manner, and providing it with “ such appendages and appliances, that its weight shall always “ be borne by rails attached to the carriage, and resting or “ moving on one or more of an endless chain of friction “ wheels, caused to revolve by the traction or propulsion of the “ carriage in a longitudinal direction, and this, whether such “ carriage move on prepared or unprepared ground, and whether “ it is propelled by animal, or steam, or any other power.” Each friction wheel revolves partly within a “ pedestal ” or box, to the upper part whereof are fixed the brass bearings for the axle of the friction wheel ; and the bottom of the pedestal, which at times comes in contact with the road, is shod with iron. The several pedestals are united by metal links, or by pieces of leather or other flexible material, so as to form an endless chain of pedestals and friction wheels, which is extended between and passes around two pairs of flanged wheels or “ tumblers ” at the opposite ends of the carriage. Between the two pairs of tumblers there is fixed a horizontal frame, having a rail attached to its lower and upper surfaces ; the under rail resting on those friction wheels which are at *the time* beneath it, and the top rail supporting the uppermost *wheels*. When the carriage is to be driven by steam power, the

hinder part is furnished with two sets of the above-described apparatus, and the fore part, which serves to guide the carriage, is supported by one set of friction wheels, &c.; but when animal power is to be employed, the guiding part may be dispensed with. On rotatory motion being given to the tumblers, "the carriage slides forward, by means of the rails attached to it, on the friction wheels beneath, while simultaneously therewith a revolving motion is imparted to each of the endless chains of wheels, which brings one wheel after another in continual succession under the rails, producing thus all the effect of one continuous rail."

[Printed, 1s. See *Mechanics' Magazine*, vol. 47, p. 103; and *Patent Journal*, vol. 2, p. 787.]

A.D. 1846, November 21.—N° 11,460.

PIDDING, WILLIAM.—1. Mode of constructing the front or leading wheels of four-wheel carriages for common roads, so that the carriage can turn to the right or left without requiring the position of the front axle to be altered, and consequently the fore wheels may be of the same diameter as the hind ones. In place of the felloes constituting an entire circle of wood, bound together by an iron tire, they are composed of detached portions of a circle, corresponding to the number of spokes. To each portion of the felloes a piece of the tire, of similar length, is affixed; and thus each spoke terminates at its outer end in a kind of wooden foot, shod with iron. The spokes are not fixed immoveably in the nave, but are capable of a slight lateral deflection, having springs on each side (contained in recesses in the nave), which yielding to lateral pressure, allow the spokes to be bent out of the perpendicular, so as to form an acute or obtuse angle with the axis. "Whilst the carriage is proceeding in a right line, the spokes are retained in a vertical plane, or at right angles to the axis, by the springs; but when the power of the horses is exerted to cause it to turn, each spoke, as it comes to the ground, is bent to the right or left, so that they may be considered as making a succession of diagonal steps, and the front of the carriage is thereby moved in the required direction."

2. Applying a "portable railway" to common road carriages. Under each side of the carriage is fixed a long horizontal frame, the upper and under sides whereof are parallel, and the ends semi-

circular. Around this frame travels a series of rollers, the axes of the rollers being connected by links, so as to form an endless chain which encircles the frame. Each link carries a small wheel, which stands at right angles thereto. These wheels keep the rollers at some distance from the ground; and the rollers serve to support the frame, and consequently the carriage. Horses are attached to the frame, which, as it is drawn forward, rolls over the lower rollers, whilst the lower wheels remain stationary upon the ground, until by the movement of the endless chain, produced by the advance of the frame, the hindmost wheel is lifted from the earth, and another wheel is brought down to the earth at the front end of the frame.

A modification of the above arrangement, to adapt it to railway carriages, is described, in which the small wheels are dispensed with, and the rollers come in contact with the rails; guide wheels or guide plates being employed to retain the carriage on the rails. In some cases it is proposed to employ, in combination with this modification, an endless band of steel, wire gauze, felt, leather, or other suitable material, passing between the lower rollers and the rails, over the upper rollers, and partly round a roller at each end of the frame.

There is another modification, consisting in the employment of endless bands of plates, passing under the wheels of carriages, to serve as a roadway, and kept in motion by the rotation of drums or rollers driven by the wheels of the carriage. The axle of the carriage wheel supports a triangular frame, having its vertex downward, and at the two upper corners of the frame there are two "square rollers," carrying an endless band, composed of metal tram plates (hinged together), and passing under the wheel; the tram plates being supported above the ground by a "shoe" at each hinge joint, fitted with springs at the sides to permit the carriage to move laterally when required. The rollers are caused to rotate by gearing from the carriage wheel, so as to lay down plates in advance of the wheel, and take up those over which it has passed.

3. Improvement in suspending the bodies of two-wheel carriages.

4. Relates to four-wheel one-horse carriages driven by a postillion, and consists in an arrangement for relieving the horse's back from the weight of the postillion.

[Printed, 11*d.* See Patent Journal, vol. 3, p. 8.]

A.D. 1847, January 19.—N° 11,537.

McINTOSH, JOHN.—This invention includes certain arrangements of apparatus for propelling carriages on common roads and railways. Around the periphery of each driving wheel is fixed a tube of india-rubber or other flexible material covered with strong leather; and this tube communicates by a hollow spoke (divided into two passages) with the axle, which is also hollow; there being a stop or abutment in the tube at the top of the hollow spoke. Steam or other fluid being introduced through the axle, and through one of the passages in the spoke, gradually inflates the tube, and, by acting against the surface of the road, turns the wheel, afterwards escaping from the tube through the other passage of the spoke. Wheels of this construction may be used on railways with suitable guide wheels, or with the rails arranged so as to prevent the wheels from running off. Or a wheel or rotary engine, constructed in like manner, may be fixed on the middle of an axle (furnished with flanged wheels to run on the ordinary rails), and caused to travel upon a central rail. This last-mentioned arrangement may be also adopted for assisting locomotive engines up inclined planes.

[Printed, 1s. 3d. See Repertory of Arts, vol. 10 (*enlarged series*), p. 148; and Patent Journal, vol. 3, p. 211.]

A.D. 1847, March 23.—N° 11,631.

FOX, CHARLES (*a communication from John George Bodmer*).—In frosty and rainy weather the driving wheels of locomotive engines frequently have too little hold or bite upon the rails to enable them to ascend an incline or start a heavy train with facility. To avoid this inconvenience, the patentee introduces pieces of hard steel or other metal into the face or tread of each driving wheel. He cuts dovetail grooves in an angular direction across the face of the tire, and into these grooves he drives the pieces of steel or other metal, which, if thought desirable, may be made to project slightly from the face or tread of the tire, so as to possess more hold or bite upon the rails.

[Printed, 1s. 3d.]

A.D. 1847, June 3.—N° 11,727.

HORNE, WILLIAM; BEADON, GEORGE; and SMITH, ANDREW.—One part of this invention relates to the steam carriage

with screw wheels, or substitutes for wheels, described in the Specification of Letters Patent No. 10,789, granted to George Beadon, July 29, 1845. In the former case, the axles of the screw wheels were connected by rods with a cross-head on the upper end of a piston rod, working through the top of an upright steam cylinder. In the present instance, two oscillating cylinders are employed, and their piston rods are connected to cranks on an intermediate shaft, carrying two bevel wheels, which gear respectively into a bevel wheel on the axle of each screw wheel, and thus cause the screw wheels to rotate and impel the carriage. The bevel wheels can be thrown out of gear when desired; and the power of the engine can then be transmitted from the intermediate shaft to any machinery required to be driven.

[Printed, 2s.]

A.D. 1847, June 29.—N° 11,771.

CHAPLIN, FREDERICK.—Increasing the bite of the driving wheels of locomotive engines upon the rails, and causing the wheels of railway carriages to run with less noise and more smoothly, by the application to the tires of such wheels of hides, skins, or leather, whether tanned, tawed, curried, or prepared in any other way, or hides in the raw state. The patentee prefers strong ox or buffalo hide, merely dried. The hide is cut into strips, about three quarters of an inch wide, which are riveted together, so as to form a belt three quarters of an inch deep (that is, the width of the strips) and half an inch wide; and this belt is fixed in a groove formed around the periphery of the wheel, so that the edge of the belt will come in contact with the rail.

[Printed, 5d. See Repertory of Arts, vol. 11 (*enlarged series*), p. 84; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 16; Patent Journal, vol. 41, p. 152; and Engineers and Architects' Journal, vol. 11, p. 114.]

A.D. 1847, July 29.—N° 11,821.

MORISON, JAMES.—The patentee describes a carriage wheel of peculiar construction, carrying a series of rails on which it travels. Around the periphery of the wheel is formed a shallow groove, to receive a series of flat bars or rails. Each rail is retained in its position by a small conical or triangular projection at its centre, which passes loosely through a hole in the tire, and *is connected by means of a helical or other spring with the*

nave. The rails are dovetailed into each other at their extremities, so that no rail can be released from supporting the wheel until the succeeding one has come into action. As the wheel passes over any obstacles or hollows in the road, the rails successively form inclined planes upon which the wheel travels. Each rail, as the wheel rolls onward, turns slightly upon its central projection, in accommodating itself to the varying point of pressure of the wheel; the springs being used for the purpose of permitting this motion, and for retaining the rails close to the periphery of the wheel.

[Printed, 11*d*. See Patent Journal, vol. 4, p. 315; and Practical Mechanics' Journal, vol. 1, p. 63.]

A.D. 1847, October 14.—N° 11,907.

LILLIE, Sir JOHN SCOTT.—The patentee describes a machine for tilling land, which is furnished with two sets of wheels, placed at right angles to each other;—one set supporting the carriage while the implements are in action; and the other set, which can be lowered or raised, sustaining the carriage when it is shifted sideways, after passing across the field, in order to bring the implements into operation upon a fresh portion of the land. On each side of the carriage there are two "square stave or skeleton drums," over which passes an endless railway, formed of wooden planks or wrought-iron plates, hinged together, so as to turn freely over the drums, and circulate around the bearing wheels of the carriage which travel thereon. The machine is hauled across the field by means of ropes or chains, worked by steam power.

"The moveable rails and hauling apparatus, already described, may be made applicable to carts or waggons for levelling land by the removal of the soil from the higher to the lower grounds, to water carts for the purposes of irrigation, and to ordinary carts or waggons for the removal of manure and such other loads as may be required for agricultural purposes; and when such carts are propelled by animal power, they may be provided with these endless rails."

The Specification also contains the description of a mowing machine, which is mounted on two sets of wheels with broad tires, but without the endless railway.

[Printed, 1*s*. 2*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 321 and Patent Journal, vol. 4, p. 553.]

A.D. 1847, November 25.—N° 11,977.

BARRAT, PIERRE PHILLIPE CÉLESTIN.—In the drawings attached to this Specification, a machine for tilling and working land by steam power is represented, having four running wheels with very broad tires to carry it over the land.

[Printed, 2s. 5d. See Patent Journal, vol. 5, p. 54.]

A.D. 1849, June 20.—N° 12,663.

CAMPBELL, ALEXANDER FRANCIS.—The patentee proposes to fix a flexible ring or tube, filled with water or other liquid, around the periphery of a carriage wheel. The tube may be made of gutta percha or other flexible waterproof material.

[Printed, 3s. 5d. See *Mechanics' Magazine*, vol. 51, p. 616; and Patent Journal, vol. 8, p. 200.]

A.D. 1849, July 18.—N° 12,710.

USHER, JAMES.—A steam carriage for tilling land by the rotatory action of curved ploughs or other implements, fixed around a horizontal shaft, is described. The fore part of the machine is carried by a pair of ordinary wheels, and the hind part is supported by a broad roller or cylinder and a pair of wheels of like diameter. The roller extends from one wheel to the other, and is fixed on the same axle.

[Printed, 9d. See *Repertory of Arts*, vol. 15 (*enlarged series*), p. 216; *Mechanics' Magazine*, vol. 52, pp. 70 and 78; *Artizan*, vol. 10, p. 145; and Patent Journal, vol. 8, p. 224.]

A.D. 1849, November 24.—N° 12,860.

CALLAWAY, GEORGE, and PURKIS, ROBERT ALLÉE.—This Specification contains a description of certain apparatus for ploughing land by steam power. In some cases the patentees attach to the back of the machine a series of rollers, placed upon a horizontal shaft, so as to form a continuous roller, for the purpose of rolling the land at the same time that it is being ploughed; "or the same roller, if required, may be made to answer the purpose of the driving wheel."

[Printed, 1s. 1d. See *Mechanics' Magazine*, vol. 53, p. 437; *Practical Mechanics' Journal*, vol. 3, pp. 106 and 259; and Patent Journal, vol. 9, p. 117.]

A.D. 1849, December 3.—N° 12,877.

DONISTHORPE, GEORGE EDMOND.—“Constructing the “driving wheels of locomotive engines in such manner that the “running surfaces thereof shall consist each of several separate “and independent parts, pressed outwards by elastic means, “whereby a larger portion of the driving wheel will be constantly “in contact with a rail, and thus may the driving wheels of locomotive engines be made more effective.” The running surface of the wheel is composed of a series of sliding blocks, placed side by side in a deep groove around the tire, and pressed outwards by a belt of vulcanized india-rubber; each block being kept in its proper position by a bolt, extending through the tire and through a slot in the block.

[Printed, 8d. See Repertory of Arts, vol. 16 (*enlarged series*), p. 146; London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 387; Mechanics Magazine, vol. 52, p. 438; and Patent Journal, vol. 9, p. 104.]

A.D. 1850, March 7.—N° 12,989.

FOWLER, JOHN junior.—The Specification of this invention contains the description of a carriage for a plough to form drains in land, which is supported by five broad wheels or rollers, two at the foremost end of the frame, and three at the hinder part.

[Printed, 3s. 2d. See Mechanics' Magazine, vol. 53, p. 218; and Patent Journal, vol. 9, p. 271.]

A.D. 1850, August 12.—N° 13,222.

THOMPSON, GEORGE.—Machinery for cutting, digging, and turning up earth, to be drawn by horses, or worked by steam or other power. The machine travels upon a pair of large wheels, but part of the weight is also borne by two wooden rollers behind.

[Printed, 1s. 1d. See Mechanics' Magazine, vol. 54, p. 137; and Patent Journal, vol. 10, p. 238.]

A.D. 1850, October 17.—N° 13,285.

FOWLER, JOHN junior.—In this Specification there is a description of a carriage for a plough to form drains in land, being an improvement on the one referred to at No. 12,989. The carriage in this instance is supported by seven wheels, viz., two broad wheels

at the front end, three wheels of less breadth near the hind end, and two narrow wheels of large diameter at the hindmost part of the frame.

[Printed, 4s. 11d. See *Mechanics' Magazine*, vol. 54, p. 337.]

A.D. 1850, November 2.—N° 13,309.

DE NANTEUIL, PIERRE ANTOINE AUGUSTE DE LA BARRE (*a communication*).—The subject of this invention is the propulsion of steam carriages by means of “kneaded levers,” resembling in form the letter J. The curved part or knee of the lever bears on the ground; the short arm of the lever carries the axes of two small rollers, placed one above the other, and including between them a rail fixed in a horizontal position to the lower part of the carriage; and the long arm of the lever is connected to the piston rod of one of a pair of horizontal steam cylinders. When steam is admitted between the front end of the cylinder and the piston, it tends to force back the long arm of the lever; but this is prevented by the bottom roller on the short arm pressing against the under side of the rail affixed to the carriage; and as the piston cannot recede, the steam forces forward the cylinder and with it the carriage, the rail sliding along over the bottom roller, which at this time sustains part of the weight of the carriage. In the return stroke, the piston draws forward the long arm, thereby slightly raising the knee from the ground and bringing the top roller down upon the upper surface of the rail, on which it rolls until the lever has completed its advancing movement. Then the impelling action previously described again takes place.

[Printed, 1s. 3d. See *Mechanics' Magazine*, vol. 54, p. 377.]

A.D. 1851, March 24.—N° 13,564.

GUTHRIE, GEORGE.—This invention consists in a machine for digging land by steam or other suitable motive power, which is mounted on four wheels, having broad rims or tires to enable it to pass easily over the land.

[Printed, 10d. See *Mechanics' Magazine*, vol. 55, p. 278; *Practical Mechanics' Journal*, vol. 4, p. 250; and *Patent Journal*, vol. 12, p. 15.]

A.D. 1851, April 24.—N° 13,600.

NICHOLLS, ROBERT HAWKINS.—“Improvements in machinery *for giving motion to agricultural and other machinery.*” The

first part of this invention is shown applied to a dibbling machine, and consists in so arranging the mechanism for impelling the machine and elevating and depressing the dibbles, that by turning a winch handle or handles the machine will be advanced a given distance at certain intervals of time, in regular succession, and remain stationary during the time necessary for effecting the operation of dibbling.

The second part of the invention consists in arranging mechanism for imparting motion to agricultural implements in such manner as to produce what the patentee terms a "walking movement." A hand dibbling machine, designated a "walking dibble," is described. The dibbles and their appendages are carried by a pair of legs, the lower ends whereof are pointed, so as to be readily pressed into the earth. Behind these legs there are two lever legs, furnished with flat feet to rest on the surface of the land. The two pairs of legs are jointed at their upper ends to two long side bars, and are also connected with each other and with the side bars by a system of levers, of which they may be said to form part. The side bars terminate at their hind ends in handles, which are to be grasped by the operator. When the implement is in use, these bars act alternately as levers of the first and second orders, having for their fulcra in one case the pins that connect them with the lever legs, and in the other case the pins that connect them with the front legs. The following is the action of the apparatus, assuming that at the commencement of the description the front legs and dibbles have just been moved forward:—The operator lifts the handles of the side bars until the feet of the lever legs rise clear of the ground, and the legs move towards the front legs; he then presses down the handles, thereby raising the front levers and dibbles clear of the ground, and through the agency of the system of levers projecting them forward a suitable distance; after which, by again lifting the handles, he inserts the dibbles in the earth, and at the same time causes the lever legs to advance; and in this manner the operations of dibbling and advancing the machine are successively carried on.

[Printed, 1s. 2d. See *Mechanics' Magazine*, vol. 55, p. 359; and *Patent Journal*, vol. 12, p. 77.]

A.D. 1851, October 23.—N^o 13,786.

PAPE, JOHN HENRY.—The patentee describes a mode of applying steam power to impel a plough. A large hollow cylinder with

a flange at each end, to roll over the ground, is connected to the frame of the plough by its axle, which is hollow. This axle supports a steam boiler and fire grate within the cylinder. The smoke passes through one end of the axle into the atmosphere; and the steam passes through a valve into an ordinary steam cylinder, suspended from the other end of the axle. The piston rod projects downward from the cylinder, and is furnished at its lower end with a foot or claw; so that when the piston is forced downward by the action of the steam, the foot or claw will take hold of the ground and impel the plough, the large cylinder at the same time rolling onward. After each down stroke, the piston is raised again by a spring.

A modification of this arrangement is represented, in which a steam cylinder is attached to each end of the hollow axle of the large cylinder, and the ends of the piston rods are fastened to crank pins on the sides of two wheels, intended to run on the land. These wheels are connected to the frame of the plough, and they are made with broad peripheries, studded with nails or projections to give them a firm hold of the ground.

The patentee also proposes to use gunpowder, gun-cotton, or other explosive substance as the moving power, instead of steam.

[Printed, 9d. See *Mechanics' Magazine*, vol. 56, p. 358.]

A.D. 1851, December 1.—N° 13,836.

EXALL, WILLIAM.—This Specification contains the description of a reaping machine of improved construction. The frame is carried by small wheels or rollers, and by a large broad wheel, called the driving wheel, which is connected by suitable gearing with the cutters and other moving parts of the apparatus, in order to actuate the same. It is formed with teeth or ribs around its periphery to give it a firm hold of the ground and ensure its rotation as the machine is drawn onward.

[Printed, 1s. 1½d. See *Mechanics' Magazine*, vol. 26, p. 476.]

A.D. 1852, March 24.—N° 14,036.

PIDDING, WILLIAM.—Improvements upon the invention which formed the subject of Letters Patent, No. 11,460, November 21, 1846.

1. Using elastic materials in the manufacture of the spokes of the wheel described under the first head of the Specification of the above invention.

2. Application of "catches" to the spokes, so as to combine the elastic force of several spokes.

3. Improved construction of nave.

4. Employing axletrees of different lengths, so as to allow of the peripheries of the divided tire wheels being brought nearer the axletrees. The patentee also proposes to make the divided tires of hardened steel, "or to have them case-hardened, or hardened by chilling, and to cover them with gutta-percha, vulcanized india-rubber, felt, or in mixed layers of each or all of these, or of any compound of gutta-percha or india-rubber, or both."

5. Improvements on the second head of the former invention, relating to three methods of laying down rails or metal plates for carriages to travel upon. Making each plate or link of the endless band or chain, described under the third method, with a semi-cylindrical rib to fit in a recess in the "shoe" or chair, and connecting the latter with the plate or link by springs at each side.

Causing the endless series of rollers (described in the second part of the former Specification) to travel upon a perfectly circular rail, which rolls along the ground, and is kept in a vertical position by a large frame, fitted with friction rollers in such manner that the circular rail works freely between the rollers. The patentee says, "This mode of conveyance may be applied for goods and passengers, or otherwise for ploughing, harrowing, irrigating, sowing, manuring, or other agricultural processes, over roads, hills, or ditches, on uncultivated as well as cultivated ground, by the modified arrangement shewn in Figure 7." In this arrangement, the circular rail is composed of rings or endless bands of gutta-percha, india-rubber, or compounds thereof, and pliable rings or endless bands of metal, placed alternately. It is proposed "to apply heat to the elastic material when off the ground, and cold to the metal, so that when it comes in contact with the gutta-percha, &c., which it will do when the endless chain of antifriction rollers runs over the gutta-percha and metal, the latter will convey or communicate its cold to the former, and make it sufficiently rigid to bear a considerable weight without bending." "The whole can be propelled by steam or other convenient motive power, or by animal or manual strength."

" Another mode of construction consists in the use of a wheel, " formed of a tube of india-rubber, compound thereof, or other " suitable material, filled with a fusible metal, such as mercury, " tin, and bismuth, or mercury, lead, and bismuth, or any other " such admixture as may be found most serviceable in practice, or " with certain or various resinous, waxy, greasy, bituminous, or " other suitable substance or substances, or compound, or with " brimstone or other substance or substances, which by the appli- " cation of heat becoming liquified, and by the application of cold " resume or assume the solid state." The patentee also uses end- less bands, composed of plates of copper or other suitable metal connected by vulcanized india-rubber. He says, " To these metal " plates I convey different degrees of temperature, producing heat " and cold rapidly; and I thus liquify and solidify the fusible " metal or other appropriate meltable substance in the interior of " the band; and the india-rubber connexions between each metallic " plate, and at the sides, allow the band to bend when the fusible " metal or substance aforesaid in the interior is liquified." " To " add to the strength of any of the above materials, substances, or " compounds, I, in certain cases, insert in the tubes, in addition " to the said substances, solids, such as plaister of Paris, chopped " whalebone fibres, chopped hemp or flax, sawdust, chopped wire, " or any suitable infusible material or materials calculated to add " strength to the substances aforesaid or compounds, when not in " a melted state. The endless chain of antifriction rollers before " described, running round rails, both of which are to be rendered " cold by artificial means, are made to run on such a tube, and " heat is applied to the remaining portion to melt the substances " or compounds contained therein." The rails mentioned in the last sentence form part of the frame that carries the rollers.

6. Improvements in the fourth part of the former invention (relating to the arrangement for relieving the horse from the weight of the postillion), and also in the manufacture of the bodies of railway or other carriages.

[Printed, 9d. See *Mechanics' Magazine*, vol. 57, p. 299.]

A.D. 1852, July 29.—N° 14,242.

WINTER, FREDERICK.—The patentee describes an apparatus for propelling carriages, consisting of an endless chain, extended in a horizontal direction over two wheels, and carrying a series of claws. *The chain is put in motion by steam or other power applied to one*

of the wheels just mentioned ; and as the chain travels around the wheels, the claws successively descend over the front wheel, catch hold of the ground and impel the carriage, ascend over the back wheel, and then pass on to the front wheel again, in order to repeat the operation.

[Printed, *6d.* See *Mechanics' Magazine*, vol. 58, p. 136.]

A.D. 1852, July 29.—N° 14,243.

MARTIN, JOHN.—Machine for hoeing turnips and other crops by horse power, the body whereof is supported by a pair of large wheels, “hooped with ribbed or serrated metal, in order to secure “them a hold on the earth.” The hoes are fixed to horizontal shafts, turning in bearings in a frame, carried by four small running wheels.

[Printed, *6d.* See *Mechanics' Magazine*, vo 58, p. 136.]

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A.D. 1852, October 1.—N° 59.

DAVIS, MARCUS.—Several improvements in the construction of wheels are included in this Specification. The patentee proposes to connect the outer ends of the spokes (which are made of metal tubes) to a hollow ring or tubular band of iron or other metal, and to cover this tube with another tube of sulphurized or vulcanized india-rubber, leather, or gutta-percha, or with a number of india-rubber rings, so as to cause the wheels to travel without noise along the road. The iron tubular band may be covered with a tube made partly of sulphurized or vulcanized india-rubber, and partly of canvas, cloth, pasteboard, &c., combined in such manner that the india-rubber will present its surface to the road. Cotton,

flannel, cloth, leather, or any soft material of a similar nature, may be placed between the iron tube and the india-rubber or other tube.

The tubular iron band may be open on the outside, so as to present two narrow edges (serving as flanges when the wheels are to run on railways) with a space between, to be filled with wood shavings, hemp, flock, cotton, or other cheap soft material, over which is to be fastened a band of sulphurized or vulcanized india-rubber; and the india-rubber band is to be protected from wear by covering it with sheet steel, such as is used for making clock or watch springs.

Instead of employing tubular bands of iron and india-rubber, wheels may be made with rims of bar or flat iron, curved into a circular form, and affixed to the tubular spokes, so that the edges of the rings or rims shall bear on the road and their broad sides be parallel to the body of the carriage, or the two edges nearest the spoke may incline towards each other. The space between the rims is to be filled with wood, buffalo horn, metal, or any of the materials before mentioned. For light carriages, the wheels may be made with only one ring or rim.

[Printed, 8½d.]

A.D. 1852, October 1.—N° 86.

KYLE, DAVID DUNNE.—Machine for excavating and removing earth, the carriage whereof consists of a long rectangular frame, supported by five pairs of small wheels, which travel upon rails laid on the surface of the ground to be excavated, each rail being made with a rib along its upper surface, and each wheel having a corresponding groove in its periphery to fit thereon. The carriage is impelled by means of levers or legs acting against moveable fulcra, which are heavy blocks, formed with teeth or indentations on the under side, to fit into racks made on the upper surface of the rail at each side of the rib.

[Printed, 7½d.]

A.D. 1852, October 1.—N° 89.

MARSHALL, JAMES NICHOLS.—“An improved wheel for carriages and other vehicles.” It is thus described in the Pro-

visional Specification:—"Two cog wheels, made fast one on each side of the tire of a wheel; fourteen revolving cog rails, each ten inches long; fourteen revolvers for the cog rails to work and turn on a pivot that runs through the revolver and through the rails, and made fast to the tire of the wheel, with a joint that will allow the revolver and the rails to lay flat on the ground while the cog wheel passes over it; and so in succession as one is laid down the hinder one is taken up and carried round, forming a constant revolving road for the wheel to work upon."

In the Final Specification, the patentee describes his invention in the following manner:—"First, an improved perpendicular wheel for carriages and other vehicles, on the scale of five feet, made of wood, with an iron cog tire. Second, twenty wooden rails, attached to an iron plate, with cogs to fit the cogs of the tire on the wheel, each nine inches long, to girt the wheel, three inches deep, and the same width as the iron tire. The rail has a steel bolt, with a pivot on each end, fixed in the centre, working in two steel collars, bolted each side of the tire. These collars leave room for the rail and revolvers to lay flat on the ground, and by them are carried round the wheel and kept firm in their places. An iron pivot passing through the wooden rail is fastened to the steel bolt in the centre for the rail and wheel to turn on the revolver,—there being as many revolvers as there are rails. The revolvers are turned twenty-seven inches girt, horizontal top and concave bottom, with iron bands. The pivot from the rail passes through the centre of these revolvers, is screwed on the rail, and acts jointly with the rail and wheel. These revolvers may be made either of iron or wood, the wood acting better for a plough, &c., and the iron for the common road."

[Printed, 2½d.]

A.D. 1852, October 1.—N° 97.

DUNLOP, JOHN MACMILLAN.—Manufacturing the tires of carriage wheels of decarbonized or annealed cast iron, into which rings of india-rubber, vulcanized or otherwise prepared, are inserted. The tire is cast with a groove to receive the ring of india-rubber; and the ring is kept in its place by pins, which

pass through it and project into a recessed part of the groove in the tire.

[Printed, 4½d.]

A.D. 1852, October 1.—N° 106.

ALLAN, THOMAS.—Introduction and application of springs in the construction of paddle wheels and screw propellers for vessels and driving wheels of locomotive engines for railways and common roads.

“ In applying my improved system of construction to the driving wheels of locomotive engines, I make the spokes of springs, and in some cases the tires also, either wholly or partially. The spring spokes might be formed like the C spring, or the volute, being fixed at one end to the nave, and at the other to the interior of the tire. The tire might also be composed by continuing the spring spokes in length, and bending the super-requisite lengths into a circular form, and then encircling the whole with an outer tire of vulcanized india-rubber, solid or tubular, or other elastic substance. In the case of a locomotive for common roads, this construction of wheel would take a greater grip of the ground, and thus overcome that tendency to slip which has hitherto proved the great obstacle to locomotive progress on common roads, where the gradients vary considerably.”

[Printed, 3½d.]

A.D. 1852, October 12.—N° 357.

DAFT, THOMAS BARNABAS.—Constructing railways of wood, suitable for sledges, and propelling a train of sledges thereon by steam power, the sledges or carriages being shod with glass or other hard substance, and provision being made for supplying water to the surface of the rails. The locomotive engine furnished with wheels, the tires whereof are made to correspond with the bearing surface of the rails, whether flat or angular, and are covered or faced with vulcanized india-rubber. When steep inclines are to be surmounted, a rack is fixed in the centre of the track between the rails, and a toothed wheel, carried by the engine, gears into such rack.

[Printed, 5½d.]

A.D. 1852, October 2^d.—N^o 480.

FOWLER, JOHN.—Machine for cutting drains in land, and drawing a continuous series of drain pipes into the same by steam power. The carriage travels on four wheels, having broad tires to prevent them from sinking into the soil.

[Printed, 10½*d*.]A.D. 1852, November 5.—N^o 641.

HALL, COLLINSON.—The nature of this invention is thus defined by the patentee:—"My improvements, which have for their object the conveyance of loose solid and fluid matters, such as night soil, sewage, liquid manure, and various sorts of grains, seeds, fibrous substances, and animal and vegetable matters adapted for food, with a smaller exertion of power, especially over uneven ground, sandy or marshy soils, or in other unfavourable localities, than has hitherto been requisite, and partly the continuous agitation of some such matters, such as night soil, sewage, and liquid manure, during their carriage, wherever such agitation may be useful in preventing the deposit of a sediment,—have reference, firstly, to the construction and employment of a revolver or carriage formed by one or more drums or cylindrical vessels, furnished with a central axis or gudgeon, and with projecting rims or disks, provided with shafts, traces, bands, straps, or chains, through the intervention of which they may be drawn or driven by horse, steam, or other motive power; the inner surface of the said drums or cylindrical vessels, when more than one are employed in a revolver or carriage, being connected, if required, by several rods or bands of metal, gutta percha, or other convenient material; and the outer circular surfaces thereof fitted, if required, to bags or receptacles adapted to loose solid or fluid matters to be carried in the said revolvers. My improvements consist, secondly, in constructing and employing a train or series of carriages or revolvers, similar to the above, which can be drawn by one and the same motive power, and which is formed by connecting the central axes or gudgeons of several of the said revolvers by rods, chains, bands, or other suitable contrivances."

[Printed, 6½*d*.]

A.D. 1852,*November 16.—N° 764.

CHRIPPES, THOMAS the younger.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* It consists in effecting the operations of ploughing or digging up, harrowing, and preparing land for seed, manuring and sowing land, and reaping the crop, by means of a steam or power engine, fixed upon a frame mounted on wheels or rollers, "which should be of larger area than the engine, to enable it to travel with facility over ploughed fields, &c."

[Printed, 2½d.]

A.D. 1852, November 27.—N° 894.

CURTIS, WILLIAM JOSEPH.—Forming tramroads and railroads of trunks of trees or pieces of timber, partly buried in the earth, and with or without iron rails, and fitting the carriages which are to run thereon with wide wheels or rollers. The ends of the wheels and rollers are preferred to be bevelled, in order that they may be readily drawn on or off the trams or rails. The wheels are made of sufficient breadth to keep upon the trams or rails without the use of flanges (either upon them or upon the trams or rails), so long as the horses or other animals employed for drawing the carriage travel in the middle of the track. For rough uses, the rollers may be made out of the trunk of a tree, cut to the proper length, and the end bevelled and furnished with iron gudgeons.

[Printed, 9½d.]

A.D. 1852, November 29.—N° 902.

FOWLER, WILLIAM, and McCOLLIN, WILLIAM.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The subject of the invention is "a machine constructed and adapted for a clod crusher and land cultivator." This machine travels on a pair of wheels, one of which is furnished with small spikes around its periphery to penetrate the earth and prevent slipping; and from this wheel motion is transmitted by wheelwork to the spindles of certain instruments employed for breaking up the land and crushing the clods.

[Printed, 5½d.]

A.D. 1852, December 24.—N^o 1162.

WILSON, JAMES GODFREY.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* Part of the invention consists in the application to the wheels of railroad and common road carriages and locomotive engines of a tire made chiefly of whalebone, so that the wearing surface, or that part of the wheel which comes in contact with the rails or road, is composed entirely of whalebone.

[Printed, 2½d.]

1853.

A.D. 1853, January 7.—N^o 48.

STEWART, GEORGE.—The object of this invention is to enable locomotive engines to ascend and descend railway inclines with greater safety and security, and to start with a train without risk of slipping on the rails. This is accomplished by “indenting or forming teeth on the flanges of the engine or carriage wheels for gearing with similar teeth or indentations on racks, either laid alongside the permanent rails or forming part of such rails.”

[Printed, 6¼d.]

A.D. 1853, January 21.—N^o 158.

CURTIS, WILLIAM JOSEPH.—Machinery for excavating or digging earth, and for carrying or delivering the soil. Broad wheels or rollers are used for supporting the framing; and in some cases, the peripheries thereof are provided with studs or ribs to increase the adhesion to the ground.

[Printed, 2s. 6¼d.]

A.D. 1853, May 4.—N° 1084.

BELL, GEORGE.—Machine for manuring land, depositing grain and other seeds, and harrowing in and rolling the same. It is supported by a roller or one or more wheels in front and a roller behind.

[Printed, 3½*d.*]

A.D. 1853, May 10.—N° 1151.

JOHNSON, JOHN HENRY (*a communication from Robert Romaine*).—Machine for digging, reaping, &c., supported by a pair of large fore wheels, made with very wide tires to prevent them from sinking too deeply into the soil, and by a pair of hind wheels of smaller diameter, but with the same width of tire.

[Printed, 1*s.* 2½*d.*]

A.D. 1853, May 12.—N° 1172.

GOBLE, GEORGE FREDRIC.—This invention consists partly in a mode of propelling carriages by means of an endless chain, carrying a series of "paddles or drags," and passing around three drums, which are arranged in such positions that the chain presents the appearance of a right-angle triangle, with the base nearly parallel to the surface of the ground. One of the drums is turned by a steam engine; and thus the paddles or drags are made to take hold of the ground in succession and impel the carriage.

[Printed, 7½*d.*]

A.D. 1853, June 25.—N° 1548.

ANDRAUD, ANTOINE.—The principal object of this invention is to facilitate the ascent of railway inclines by locomotive engines. The tires of the driving wheels are made with one half of the surface (nearest the flange) smooth to run on the rails as usual; and the other half is composed of a metal band, which is striated, or *made with small intersecting grooves or lines of teeth, like a cross-*

cut file, and is let into the tire so as to project slightly above the smooth part. It is intended to travel upon a wooden rail, which is fixed outside the ordinary iron rail, and may be "metallized and "covered as best adapted to render the adherence of the striated "wheel as strong as possible."

[Printed, 4½d.]

A.D. 1853, July 5.—N° 1599.

DAVIS, MARCUS.—Part of this invention relates to the manufacture of wheels for carriages with a deep groove or channel, of a dovetail or other suitable shape, in the periphery or tire, into which india-rubber or other elastic material is introduced. One of the wheels is composed of two halves (each resembling a wheel), which, when bolted together, form a dovetail groove around the periphery, and hold therein a corresponding dovetail projection on the interior of a ring or band of india-rubber or similar material, which constitutes the running surface of the wheel. The india-rubber band may be made with pendulous pieces or projections on its inner surface, to be inserted in recesses in the wheel and fastened therein by pins. Instead of the wheel being manufactured in halves, it may be made of one piece of metal,—the sides of the groove or channel forming an acute angle with the base. "The "india-rubber is then laid in a soft or somewhat fluid state, and "then vulcanized in the wheel by Hancock's patent, or prepared "by any other process or patent in use. Or I use the wheel in "one piece, and the india-rubber hardened by any of the processes "now in use on the part lying on the wheel and projecting into the "dovetail, and the outer part that runs on the road is prepared of "soft rubber, combined with or joined to such hard material or "rubber as previously described; or I use india-rubber combined "with gutta-percha, cork, cotton, or any other material with "which india-rubber is combined; or I use asphalte or any combination of asphalte or similar material, laid in the grooves of "wheels as described."

[Printed, 9½d.]

A.D. 1853, August 6.—N° 1842.

SOUTHAN, HENRY.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent*

was not given within the time prescribed by the Act. "Improvements in ploughs," which are thus described by the inventor:—"My improvements consist in forming that portion of a plough known as the 'sock' or share (and which is situated immediately in front of the 'mould board,') in the form of a screw, having any sufficient number of blades or 'worms,' which blades may be of any desirable pitch to suit the soil through which they are to work. In some cases I may make the blades of such a size and pitch that a mould board will be unnecessary, as in the progress of the screw the blades will sufficiently throw over the soil. I also form that part termed the 'beam' more curved than in ordinary ploughs. This plough may be driven by either steam or horse power."

The above invention is introduced into this series of Abridgments, because the screw, while breaking up the soil, will also act as an "aid to locomotion."

[Printed, 2½d.]

A.D. 1853, August 13.—N° 1899.

HOSKYNS, CHANDOS WREN.—Machine for cultivating land by steam power, mounted on two pairs of very broad wheels or rollers; the driving wheels or rollers being made with ribs across the periphery, to ensure a sufficient bite or hold upon the ground.

[Printed, 8½d.]

A.D. 1853, November 1.—N° 2530.

BAUER, JOSEPH.—Steam digging and harrowing machine supported by four wheels, viz., two large hind wheels with broad smooth tires, placed outside the framing of the machine; and two small fore wheels, situated beneath the framing, and acting as the driving or pulling wheels. With regard to the latter, the patentee remarks "their tires are not even, but concave for the third part of their breadth in their middle. This is in order to prevent their sinking too much into the ground, as also to retain the wheels in a straight direction, and to prevent their sliding sideways."

[Printed, 2s. 8½d.]

A.D. 1853, November 25.—N^o 2741.

DE MONTFERRIER, ALEXANDRE ANDRÉ VICTOR SARRAZIN.
—“An improved mode of constructing the wheels of land carriages
“for common roads and railroads, so as to facilitate their progress,
“and reduce the wear and tear.” The wheel is composed of two
separate parts; “one part is fixed to the vehicle in the ordinary
“manner, and moves within the second part, which consists of a
“circular plate, put in contact with the common road or rail-
“road.” The first part consists of a nave with four radial spokes.
The spokes are double, each pair being connected at the outer
ends by a pin, which carries a small grooved roller. The circular
plate is fitted into the space between the double spokes, so that the
rollers may bear upon the edges of four equidistant circular open-
ings in the circular plate, and the nave may play freely in a
central circular opening in the plate. “By this means the vehicle
“is supported and made to move on the inner edges of the circular
“openings.”

[Printed, 74d.]

1854.

A.D. 1854, February 22.—N^o 431.

BOYDELL, JAMES.—Relates to the invention protected by Letters
Patent No. 11,357, August 29, 1846, “which consisted in the
“application of moveable detached parts of a railway to the wheels
“of carriages, whereby each part is successively placed by its wheel
“on to the road or land over which the carriage travelled; each
“part of the portable railway, when down, allowing its wheel to
“roll over it; the wheel depositing and lifting the parts of the
“railway in succession.” In the present instance, “the parts of
“the rails on which the wheels of a carriage run are each fixed to a
“plate, by preference of wood strengthened with iron, so that the
“surface bearing of the plate is considerable as compared with the
“width of the tyre of the wheel, the plate extending considerably
“on either side of the rail on which the wheels run. The ends
“of the bearing plates are formed so as to match into each other,
“and in each case to extend beyond the end of the portion of

"rail which a bearing plate carries, so that when a carriage wheel comes to the end of one portion of rail, it does not come to the end of the bearing plate on which that part of the rail is fixed, but is received on to and is supported by the next portion of rail, before the wheel has passed beyond the end of the previous bearing plate." "For lightness with strength and stiffness, it is preferred to use light trough rails of iron, filled with wood, and fixed by rivets or otherwise to the bearing plate." To the middle of each bearing plate is fastened a piece of metal, similar to a ∇ inverted (thus Λ), termed by the patentee "a triangle," and serving to connect the plate to the wheel. The triangle passes between two guide plates, fixed to the side of the wheel; and it is prevented from withdrawing therefrom by a stud at its apex. This stud, when its bearing plate is about to be laid upon the ground, enters a notch at the foremost end of one of the guide plates, and serves, in conjunction with a stop (affixed to the wheel), to lay the plate in a correct position; the stop projecting radially beyond the periphery of the wheel, and the end of the bearing plate coming in contact therewith.

[Printed, 9d. See also No. 11,357.]

A.D. 1854, July 6.—No 1487.

JOHNSON, JOHN HENRY (*a communication from Robert Romaine*).—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* It relates principally to the digging machine described in the Specification of Letters Patent No. 1151, May 10, 1853. The body of the machine is carried by two large wheels with broad tires. "The framework is extended downwards to carry the transverse shaft of the digging or working cylinder, behind which shaft, at the extreme hind end of the machine, is a bearing or supporting roller, for relieving the frame of a portion of its dead weight." Power is transmitted from two steam cylinders to the digger shaft, and also to a transverse shaft, placed just behind the large carrying wheels. "This transverse shaft has upon it a pair of metal pulleys, formed with india-rubber or other elastic surfaces, each of which surfaces is opposed to the broad periphery of one of the main carrying wheels. With this arrangement, as the digging goes on, the digging bars are kept well fed up to their work by the propelling

“ action given to the main carrying wheels from the engine shafts
“ through the elastic drums.”

[Printed, 8d. See also No. 1151 (1853).]

A.D. 1854, July 24.—N° 1626.

COLE, BEAUMONT, the younger.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The subject of the invention is a rotary plough or grubber, put in motion by a steam or other engine fixed on the same frame or carriage, which travels upon wheels or rollers over the field.

[Printed, 8d.]

1855.

A.D. 1855, January 6.—N° 35.

JOHNSON, JOHN HENRY (*a communication from Robert Romaine*).—This invention relates generally to the digging machine described in the Specification of Letters Patent, No. 1151, May 10, 1853. The body of the machine is carried by two large wheels with broad tires. “The framework is extended downwards “ to carry the transverse shaft of the digging or working cylinder; “ behind which shaft, at the extreme hind end of the machine, is “ a bearing or supporting roller for relieving the frame of a portion “ of its dead weight.” Power is transmitted from two steam cylinders to the digger shaft, and also to a transverse shaft, placed just behind the large carrying wheels. “This transverse shaft has “ upon it a pair of metal pulleys formed with india-rubber or other “ elastic surfaces, each of which surfaces is opposed to the broad “ periphery of one of the main carrying wheels. With this arrangement, as the digging goes on, the digging bars are kept well fed “ up to their work by the propelling action given to the main “ carrying wheels from the engine shafts through the elastic “ drums.”

A modification of the machine is described, in which another method of communicating motion from the transverse shaft to the

large running wheels is adopted. "In place of using frictional rollers or pulleys for that purpose, two rollers L are employed; having a number of studs, pins, or teeth on their peripheries, which take into corresponding holes or recesses formed in the peripheries of the main supporting wheels."

[Printed, 1s. 1d. See also Nos. 1151 (1853), and 1487 (1854).]

A.D. 1855 N° 35*.

ROMAINE, ROBERT.—Memorandum of Alteration to the Specification of Letters Patent No. 35 (1855). Filed in the Great Seal Patent Office, July 9, 1856. The Specification contains the description of two arrangements of machinery for digging or tilling land. In the explanation of the second machine the following sentence occurs:—"In place of using frictional rollers or pulleys for that purpose, two rollers L are employed, having a number of studs, pins, or teeth on their peripheries, which take into corresponding holes or recesses formed in the peripheries of the main supporting wheels." In the Memorandum of Alteration this sentence is altered, so as to read thus:—"In place of using frictional rollers or pulleys for that purpose, two pinions L are employed, having studs or teeth on their peripheries, which work into corresponding holes or teeth formed in the peripheries of the main supporting wheels."

[Printed, 5d.]

A.D. 1855, March 8.—N° 516.

HAZELDINE, GEORGE.—Improvements in the construction of common road carriages, carts, ambulance or hospital carriages for soldiers, &c., and in wheels for the same. With respect to the latter, the patentee remarks, "And in order to enable wheel carriages, arranged and constructed as described, to travel with facility on soft ground, I construct the wheels thereof with additional removable tyres, broader than the felloes of such wheels,—said tyres being made in parts somewhat similar to the felloes, and bolted on or securely attached thereto, and, if need be, easily and readily detachable therefrom."

[Printed, 10d.]

A.D. 1855, March 24.—N° 649.

SCOTT, URIAH.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was*

not given within the time prescribed by the Act. It includes the following improvement in the construction of carriage wheels :— After explaining an improved nave, the inventor says, “ I will now “ proceed to describe my periphery or filly, which, like my nave, “ may be either constructed of wood or iron ; if the latter, it will “ simply resolve itself into a double tire, and between which I “ introduce cushions of india-rubber or other elastic material, “ secured by screws both from the inside and from the outside, in “ such a manner as shall not admit of the slightest metallic con- “ nection between the outer tire and the inner or filly of the wheel “ If, on the other hand, I require no metal tire, I employ certain “ lengths of india-rubber instead of the blocks or cushions before “ mentioned, and secure them by screws in the same manner as “ before to the filly of the wheel.”

[Printed, 3d.]

A.D. 1855, June 12.—N° 1343.

FORD, HENRY WILLIAM.—“ Self-locomotive agricultural engine,” which travels on two pairs of broad running wheels, and is intended to carry and actuate various agricultural implements.

[Printed, 2s. 10d.]

A.D. 1855, July 16.—N° 1591.

REGAZZOLI, ANTOINE (*a communication from Joseph Grassi*). —“ Improved machinery or means for enabling a locomotive with “ its train to ascend steep gradients on a line of railway. For this “ purpose a cylinder having on its circumference two helices, which “ form a double-threaded screw, is placed under and parallel to “ the axis of the boiler, and, when put in motion by steam from “ the engine, gears with a series of circular posts or horizontal “ pulleys, placed between the line of rails of steep gradients ; “ which pulleys or posts act as a female-threaded screw. By the “ above arrangement, the locomotive with its train is propelled or “ screwed up the incline, and when descending the same it acts “ as a ‘break.’”

[Printed, 6d.]

A.D. 1855, July 23.—N° 1663.

GOODYEAR, CHARLES.—*This invention did not proceed to the Great Seal.* It consists in manufacturing wheels for carriages and

other vehicles of hard compounds of india-rubber, with or without metal. "Each wheel is made in two parts, which are fixed together by means of screws and nuts; and where the wheels are desired to move without noise, vulcanized india-rubber is shut in between the two parts, by which the surface which comes in contact with the road is elastic."

[Printed, 3*d*.]

A.D. 1855, July 27.—N^o 1706.

ALLEN, WILLIAM.—Vehicle for the transport of camp baggage, constructed in such manner that some of the parts form the supports or framework of a tent. "The vehicle consists of a wheel of iron or other suitable material, having a broad tire, which is composed of separate felloes, bolted or otherwise fixed together, but capable of being easily separated when required. The wheel forms a sort of circular box or barrel, which serves to contain the canvass of the tent, and also, if required, a proportion of ammunition, provisions, and baggage. The ends are secured by two other wheels fitted to them. These wheels are also capable of being taken to pieces when required. An axle passes through the whole, and the vehicle is propelled by a man at each side, or otherwise, so that it rolls along on the ground with its contents, and is thus easily propelled." "To erect the tent, the wheels are taken to pieces, and the spokes, with the felloes on their ends, are placed upright in the ground, and the canvass is stretched over them, and secured by pegs or otherwise in the ordinary manner."

[Printed, 7*d*.]

A.D. 1855, July 30.—N^o 1732.

HANSON, JOHN.—Machine for digging potatoes. "The implement consists of a light open timber frame, supported on four running wheels, the motion of the main axle being applied to the driving of an arrangement of rotatory digging forks." The wheels of the main axle are of large diameter, "and they are furnished with radial spikes on their peripheries, so as to have a firm hold upon the ground in revolving, and thus provide sufficient resistance for the fork-driving action."

[Printed, 10*d*.]

A.D. 1855, August 27.—N° 1939.

LUDBROOK, SAMUEL.—“Forming the periphery or outside edge of railway wheels of wood, forced and pressed into and between suitable holding plates and chambers in such manner as to form a very hard and compact surface, with the grain of the wood so placed as to be at right angles, or as nearly so as may be, to the surface of the rail at the point where the edge of the wheel comes in contact therewith.”

[Printed, 6d.]

A.D. 1855, August 29.—N° 1953.

HANSON, JOHN.—“Improvements in machinery or apparatus for digging or working land, and removing roots or plants therefrom.” The machine is supported by a pair of small adjustable hind wheels, and a central front wheel of large diameter, having radial spikes on its periphery, to ensure its rotation when the machine is drawn forward. From the axle of this wheel motion is communicated to a horizontal shaft at the rear end of the machine, carrying suitable instruments for cutting up and disintegrating the soil, or for thinning root crops.

[Printed, 1s. 1d. See also No. 1732 (1855).]

A.D. 1855, September 17.—N° 2093.

SCOTT, URIAH.—*This invention did not proceed to the Great Seal.*—Part of it relates to the application of an elastic material to the periphery of a carriage wheel. The improvement is thus described by the inventor:—“Having thus fitted all my spokes, I shrink on or attach my metal felloe, and secure it with bolts or pins to the socket at the extremities of the spokes. When no elastic material has been used in the nave or axle, it will be advisable to add another tire or band of india-rubber, felt, or other soft material, which is secured to the metal or other felloe by having square nuts introduced into the body of the material, into which the screws or bolts are inserted; over this I may again place a metal tire, according to the degree of wear or quietness required in the carriage.”

[Printed, 3d. See also No. 640 (1855).]

A.D. 1855, October 5.—N^o 2224.

HALKETT, PETER ALEXANDER.—This invention consists in applying the implements required for “ploughing, scarifying, sowing, reaping, or other operation of culture, by means of a travelling carriage, moving on tramways or rails, or on other manufactured ways, placed in parallel lines across the fields.” In some cases it is proposed to fix racks to the sides of the rails, in order to afford sufficient hold to the driving wheels of the carriage or platform, which of course must be made with teeth around their peripheries to gear into the racks. One of the travelling platforms represented in the drawings attached to the Specification is supported by eight small wheels at each side; and the axles of these wheels are provided with cranks at their ends, connected together by a long rod, at the side of the platform, to which a reciprocating movement is given by a steam-engine. “By thus placing the platform on a great number of wheels, the weight is distributed over the rails, thereby diminishing the pressure on any given point; and at the same time by driving the whole of the wheels the full friction of contact caused by the weight of the platform on the rails is exerted in traction.”

[Printed, 1s. 6d.]

A.D. 1855, November 9.—N^o 2521.

RAYWOOD, JOHN.—“An improved rolling, crushing or pressing, dibbling, sowing, and harrowing machine for wheat and other agricultural and garden produce, and for general and particular purposes, the same to be worked by steam or horse power, or by manual labour, or otherwise.” The frame of the machine is supported by a pair of large running wheels at the middle of its length, and is also furnished with a pair of small wheels in advance of the former. Two wheels or drums are mounted in the frame, one before and the other behind the axle of the large running wheels; and around such drums passes an endless chain of wooden or metallic links carrying a series of dibbles. As the machine moves onward, the endless chain travels around the two drums, and the dibbles are pressed into the earth by the foremost drum, and raised by the other drum. At the front end of the frame there is a hollow roller for depositing lime, dry ashes, sand, &c.

Behind the second drum there is a seed-depositing apparatus; and this is followed by hoes and rakes or harrows, attached to the rear end of the frame.

The patentee says, "What I claim is the right to use or adapt at any time the whole or any part of these appliances or apparatus in any way desirable or convenient, as the same may be attached to any cart, roller, harrow, carriage, dray, plough, or implement, to be used in transit or conveyance, farming operations, or otherwise. And some of the advantages which I believe to be derived are, that by the construction of the chain of links passing over one or more wheels, I form what may be termed a continuous railroad, enabling a greater weight to be drawn when brought to bear upon the pressers, dibbles, &c., by which also I am enabled to lift out the dibbles in an almost perpendicular direction." "And it is also intended that the working wheels of the machine shall rise and fall, in order to allow the machine to travel on an ordinary road, in its transit from place to place, without the pressers or dibbles touching the ground."

[Printed, 7*d.*]

A.D. 1855, December 17.—N^o 2348.

EVANS, OMROD COFFEEN.—"Machine for spading or breaking up the earth preparatory to planting. The machine consists of a truck or cart, supporting a framework in which revolves a series of drums or broad-faced wheels, side by side, each carrying an endless belt or chain, and upon which a series of spades or spading forks is placed. The operation of these is such, that as the machine is drawn over the ground, each spade is driven into the ground gradually and in successive order, and so as simply to pierce the same without breaking in the first instance. The upheaval or turning of the sod or earth is performed only at the time of leaving the ground." Each endless chain is kept distended by two pulleys, one before and the other behind the drum; and as the machine advances, the chain travels around the drum and pulleys, each part successively descending to the ground and forming a kind of tramway for the drum, which rolls upon it and forces the spades or forks into the earth.

[Printed, 7*d.*]

1856.

A.D. 1856, January 4.—N° 31.

HART, CHARLES. — *Void by reason of the patentee having neglected to file a Specification in pursuance of the conditions of the Letters Patent.* The first part of this invention relates to the construction of portable or locomotive steam-engines, adapted more particularly for agricultural purposes. After describing the general arrangement of the engine, the patentee says, "In order to facilitate the travelling upon soft land, I use a circular endless rail, wider and larger in diameter than the rim of the travelling wheels, fitted with suitable guides for keeping it in its proper position around the travelling wheels."

[Printed, 3d.]

A.D. 1856, January 7.—N° 55.

BROOMAN, RICHARD ARCHIBALD (*a communication*).— Machine for boring or excavating earth, stone, and rock. A horizontal steam-engine, fixed on the frame of the machine, communicates motion to a crank shaft, and thence through bevelled toothed wheels to the boring or excavating apparatus. "This cranked shaft is prolonged outside of the frame on both sides, and carries on each end toothed pinions, which gear into a toothed wheel on the axis of a pair of wheels, the rims of which are pointed or jagged, in order to take firm hold of the ground and cause the forward motion of the machine when at work."

[Printed, 7d.]

A.D. 1856, February 9.—N° 345.

DUNCAN, JOHN WALLACE.—The last part of this invention relates to apparatus for impelling a raft or vessel through water and also over land or ice. The raft is supported by two buoyant metal cylinders with conical ends, which extend in a horizontal direction beneath the deck, and turn in bearings connected to the under side of the same; each cylinder being divided at the middle of its length into two parts, so as to form a space for the reception

of gearing, which communicates motion from a steam engine to the axis of the cylinder. The outer surfaces of the cylinders are furnished with spiral or screw blades, which impel the raft or vessel through the water, when immersed therein. "In travelling on land, the raft should be fitted with two or three plain cylinders, "placed transversely to the screw cylinders," and supporting the weight of the raft, but at the same time permitting the screw blades to enter or take hold of the ground, in order to impel the raft. Instead of employing the screw blades as propellers while on land, the transverse plain cylinders may be lowered (so as to raise the screw blades from the ground), and the power of the engine applied to the plain cylinders, for the purpose of impelling the raft. "Instead of making the screw cylinders inflexible in their length, they may consist of short lengths, fitted in their bearings so that they may accommodate themselves more or less to inequalities of the ground, or that the fore parts may be more or less inclined, in order to mount over any obstacle or ascend an abrupt ascent. "The screw and transverse cylinders may be fitted with water-tight hatch holes, and the interior fitted up for the stowage of goods "in greater or less quantity, either for land or water transit."

The patentee says, "Another improvement under this head of my invention consists in constructing a machine on the principle of the raft last herein-before described, having cylinders with spirals or screws thereon, in the application of steam to cultivation, for the purpose of carrying or dragging implements or other things necessary over or through the land."

[Printed, 3s.]

A.D. 1856, April 7.—N° 844.

FULLER, WILLIAM COLES.—"Improvements in constructing and adapting india-rubber as tyres for wheels,"—consisting, first, in "methods of making the tyres of india-rubber and canvas combined, so as to be non-elastic in the direction of their length, and therefore less liable to become displaced in use;" secondly, in "modes of fixing by said projecting rims or flanges and screws or fasteners in combination with india-rubber and canvas tyres;" and thirdly, in "fixing india-rubber tyres by vulcanizing on to the wheel itself."

[Printed, 7d.]

A.D. 1856, April 25.—N° 993.

HARDACRE, JAMES.—Part of this invention relates to wheels for common road carriages, railway carriages, and artillery, and consists in making them with spring spokes, which are curved to any desired form, and bolted or riveted to the rim and boss or nave. The spokes are made of tempered steel, and gradually taper in thickness or width from the boss to the rim. "The rim of the wheel may either be in one piece or composed of segments, and made of any width or shape to suit the various requirements. The rim may also be a compound of wood and metal," the metal part being made in the form of a circular trough, to receive segmental pieces of wood, which constitute the outer or running surface of the wheel.

[Printed, 1s. 1d.]

A.D. 1856, May 14.—N° 1138.

SCOTT, URIAH.—One part of this invention relates to the application of an elastic material to the periphery of a carriage wheel. In the Provisional Specification it is explained by the inventor in the following manner :—" My periphery of the wheel, if made of iron, I employ angle-shape,—the spokes to be attached to the same by means of lugs or sockets ; on and around this tire I may or may not use a second tire, with india-rubber or felt, or with both combined, intervening, and secured by screws or bolts from the inner or outer tire, holding into metal sockets or nuts introduced into the elastic material." In the drawings attached to the Specification two methods of effecting the improvement are represented. In one case, the elastic material is placed between an inner and outer tire of iron ; and in the other case, there is only one iron tire, to which the elastic material is attached, so as to come in contact with the ground.

[Printed, 10d.]

A.D. 1856, June 21.—N° 1463.

GILBEE, WILLIAM ARMAND (*a communication*).— *This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* " The object of the invention is to increase the adherence between the wheels of locomotives and the rails

“ on railroads, and also to increase the speed of vehicles on common roads; and consists, first, in the applying of an extra wheel in the middle of the axletree of the locomotive. Secondly, in the widening of the crown of locomotive wheels, and in the employment of rails of hard wood, fitted close to the iron rails. These wooden rails present their fibres to the action of the crown of the wheels, which press on the rails. That part of the crown which presses on the wooden rail is provided with small sharp conical steel blades.” “These wooden rails may be used with advantage when horse power is applied for locomotion on cross roads, communicating with small towns and villages.”

[Printed, 3d.]

A.D. 1856, June 24.—N° 1480.

DAVIES, DAVID.—*This invention did not proceed to the Great Seal.* “Improvements in wheel tyres,” which the inventor thus describes, “I take an iron tyre, having flanges or projections at the sides, which I shrink on to the felloes of the wheels in the usual manner. I then take a strip or band of leather of sufficient thickness to fill up the space between the flanges of the tyre, and fasten it therein in any suitable manner. I then take a second wider strip of leather, which I fasten round the former, securing them to each other and to the wheel by nails or other fastenings passing through to the felloes of the wheel; by which means I form a durable and noiseless tyre.”

[Printed, 3d.]

A.D. 1856, July 1.—N° 1540.

LONGRIDGE, JAMES ATKINSON.—These “improvements in the application of mechanical motive power to the field operations of agriculture consist in the application of a screw, somewhat similar to the well-known screw-propeller, to the propulsion of a locomotive carriage over land for agricultural purposes; the motive power being placed on the carriage, which moves on broad wheels [or rollers], while some portion of the weight rests on the screw propeller, which is partially immersed in the land. The motive power is applied to the rotation of the screw, which advances and propels the carriage over the ground. The

“ implements of culture may either be affixed to the same carriage
“ or attached to another frame or carriage impelled by the loco-
“ motive screw carriage.”

[Printed, 4d.]

A.D. 1856, July 10.—N° 1635.

FOWLER, JOHN, junior, and WORBY, WILLIAM.—“ Improve-
“ ments in machinery for ploughing and tilling land by steam.”
Part of this invention consists in using “ as an anchor, a carriage
“ with disc wheels, which in being dragged along cut into the
“ land, and the tackle [for drawing the ploughs] being fixed to
“ the side of the carriage, is resisted by the wheels so sunk into
“ the land.” The carriage is furnished with two pairs of discs,
and upon the axis of each pair is mounted a roller, which travels
on the surface of the ground, and sustains the weight of the
carriage.

[Printed, 2s. 6d.]

A.D. 1856, July 12.—N° 1648.

POPE, JOHN.—*Void by reason of the Patentee having neglected
to file a Specification in pursuance of the conditions of the Letters
Patent.* This invention consists in applying steam power to
ploughing and other agricultural purposes, by connecting the
implements to “ a light locomotive engine, mounted on broad
“ wheels or rollers, having transverse ribs projecting on the
“ periphery, or other suitable projections, to hold the ground and
“ afford sufficient bite for traction ; the breadth of the wheels or
“ rollers at the same time prevents any prejudicial sinking in the
“ ground.”

[Printed, 3d.]

A.D. 1856, August 12.—N° 1891.

DOWNING, JAMES WEAVER.—*This invention received Pro-
visional Protection, but notice to proceed with the application for
Letters Patent was not given within the time prescribed by the
Act.* It consists in “ making the tires of wooden or non-metallic
“ wheels by placing a flat annular plate on either side of the wheel ;
“ the said plates being parallel, and their edges flush with the edge

“ of the wheel. The said plates are fixed on the wheel by pins or
“ screws, or other such like fastenings, passing through the said
“ plates and wheel and binding the whole together.”

[Printed, 3d.]

A.D. 1856, August 18.—N° 1926.

CAMBRIDGE, WILLIAM COLBORNE.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* It is thus described by the inventor :—“ My invention of
“ improvements in the constructing of portable railways consists in
“ adapting to the running wheels of portable engines used principally for agricultural purposes, or to the running wheels of
“ various agricultural implements, waggons, carts, or carriages, of
“ a flexible metallic road or railway, composed of sections or parts
“ of any convenient length, and adapted to the outside of the wheel
“ in such a manner that the said sections or parts of the portable
“ railway may, as the carriage, engine, or implement advances, be
“ laid down on the ground, so as to allow the wheels of the carriage
“ to pass over the same, in the same way that the wheels of a locomotive engine or railway carriage pass over the fixed rails of a
“ railway.

“ In making my portable railway, I construct it of broad plates
“ or sheets of iron, which will have an extensive bearing on the
“ surface of the ground, so that on a soft soil the carriage may be
“ supported on the surface without sinking in. On the top and
“ along the centre of these plates or sheets is fixed a raised rail, of
“ such a length as to admit of the several successive lengths of rail
“ meeting or abutting against each other, end for end, so as to
“ form a continuous rail under the wheels. I propose that the
“ broad plates or sheets of iron be provided at each side with
“ flanges or angle iron, to prevent the earth from squeezing over
“ the edges of the plates, and being lifted thereby. The several
“ sections or parts of which the portable railway is composed are
“ connected to centres by means of arms, which, as the carriage
“ advances, lay down the sections successively in front of the
“ wheels, and take them up again when the wheels have passed
“ over.”

[Printed, 3d.]

A.D. 1856, August 25.—N° 1978.

BARRAT, PIERRE PHILIPPE CELESTIN, and BARRAT, JEAN BAPTISTE.—*This invention received Provisional Protection, but notice to proceed with the application for Letters Patent was not given within the time prescribed by the Act.* The inventors state that it consists of “improvements in and modifications of the steam-digging machinery patented on our behalf, and as a communication from us, by J. H. Johnson, on the 10th May, 1853;” but this statement has been found to be incorrect,—reference should have been made to Letters Patent, No. 11,977, November 25, 1847. The improvements are enumerated, but not described in full. The only one which appears to belong to this series of Abridgments is the “placing shoes, skids, or guards on the peripheries of the motive wheels.”

[Printed, 3*d*.]

A.D. 1856, September 5.—N° 2065.

MONCKTON, HENRY EDWARD CRADOCK, and CLARK, WILLIAM.—In the Specification of these Letters Patent, three machines for tilling or digging the soil are described. The first machine travels on two broad rollers, formed with rims on their peripheries, to give them a firm hold of the ground. The other machines are each supported by a broad roller in front, and by two broad wheels behind.

[Printed, 1*s*. 5*d*.]

A.D. 1856, September 11.—N° 2121.

ROBINSON, JOHN BLYTHE (*a communication from Robert Romaine*).—Improvements in the steam digging or tilling machinery described in the Specification of Letters Patent No. 1151, May 10, 1853, and No. 35, January 6, 1855. The machine travels on a pair of front “caster wheels,” whereby it can be guided, and upon a pair of large and broad hind wheels, having a groove in the middle of the periphery, with teeth formed therein, to gear with pinions on two transverse shafts, put in motion by the steam engine; such teeth consisting of bolts, passed transversely through the rim, and encircled by ferrules. If preferred, the teeth may *project from either side of the rim, instead of being situated in the middle of the same.*

In a modification of the machine, motion is communicated from the steam engine, through spur gearing, to a transverse shaft, carrying two pinions, which gear into teeth on the inner surface of the rims or tires of the large running wheels. For soft and wet soils, the bite of the wheels is increased by fixing conical or rectangular spikes or studs on the periphery.

[Printed, 1s. 1d. See also Nos. 1151 (1853), 1487 (1854), and 35 (1855).]

A.D. 1856, October 30.—N° 2552.

HOLCROFT, HENRY.—“Improved construction of steam-engine, specially adapted for the tillage of land; which engine is propelled by means of a traction screw or propeller.” “The traction screw, which is placed in front at a right angle to the axis of the boiler, is composed of a cylinder, having one, two, or more threads formed upon it; or it may consist of a propeller formed of a single or double series of blades, placed at a suitable angle, and fixed to the axis, which works in bearings on the lower part of a vertical telescopic tube or cylinder, which slides vertically up and down, as well as a motion round its axis, in an outer case or cylinder firmly fixed to a plate on the boiler. At the upper part of the telescopic cylinder is a steam cylinder and piston, the rod of which actuates by a crank the traction screw.” Suitable apparatus is provided for lowering and raising the telescopic cylinder, and with it the traction screw. At starting, rotary motion is first communicated to the screw, which is then lowered, until it has entered the soil to the required depth. By the continued rotation of the screw, the engine, which is mounted on two pairs of running wheels, is caused to advance over the land, and draw the ploughs or other implements attached to it.

[Printed, 1s. 3d.]

A.D. 1856, December 11.—N° 2947.

CAMBRIDGE, WILLIAM COLBORNE. — Endless railway for facilitating the movement of portable engines, carriages, steam ploughs, or other agricultural implements over loose ground and irregular surfaces. To each wheel is adapted “a set of plates or sustaining pieces, made flat on their under face, which severally receive in turn the pressure of the wheel as it revolves. These sustaining pieces are connected together by being jointed

“ to a double set of levers, which act as links, and bind all the
“ parts together into an endless railway. At about the middle
“ of the length of the sustaining pieces, and at either side
“ thereof, lugs are formed to receive the junction pins of the
“ levers or links.” “The sustaining pieces are provided with
“ bearing rails to receive the pressure of the periphery of the
“ wheel, and being thus supported at the middle of their length,
“ they are severally free to take up a horizontal position, or adjust
“ themselves to the irregularities of the road or way before the
“ pressure of the running wheel comes upon them.” Side pieces
or guides are fixed to the sustaining pieces on each side of the
bearing rail, so as to form a kind of groove in which the wheel
runs and is thus kept on the rail. The railway is not fastened to
the wheel, but merely forms a kind of endless chain around the
periphery, from which it may be removed by simply withdrawing
the junction pin or bolt from one of the pairs of levers or links,
so as to break the continuity of the endless chain.

[Printed, 5*d.*]

A.D. 1856, December 31.—N° 3102.

BRAY, WILLIAM.—“Improvements in traction engines.” The
patentee remarks that “the wheels of traction engines, adapted for
“ ploughing or dragging weights over soft ground, have not suffi-
“ cient hold upon the ground if constructed in the ordinary manner.
“ By my improvements I construct the wheels with teeth or blades
“ which enter the ground and obtain a firm hold. These teeth are
“ made to slide or move in and out by an excentric or other me-
“ chanical means, so that they clear themselves of the soil and are
“ again ready to enter the ground. The eccentric is capable of
“ adjustment, so that the projection of the teeth may be varied ;
“ and thus the wheel may at pleasure be made to act like an ordi-
“ nary wheel. This adjustment enables the wheels to run well upon
“ hard ground when required.” The engine may have two driving
wheels, or it may be furnished with only one driving wheel, con-
structed as above described.

[Printed, 10*d.*]

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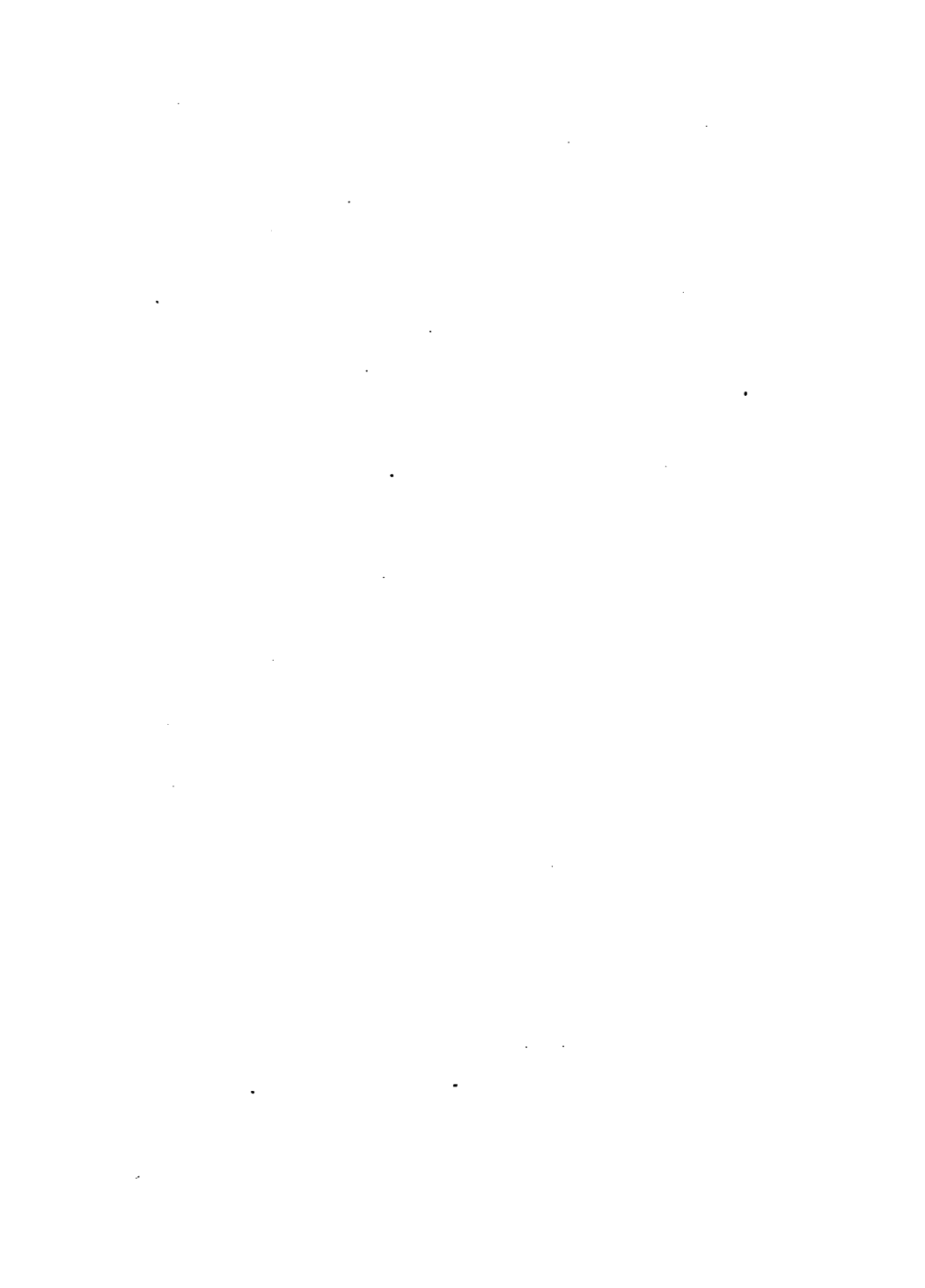
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| Belfast ( <i>Harbour Office, Corporation Square</i> ).                                          | Lancaster ( <i>Mechanics' Institute, Market Street</i> ).                       |
| Beverley ( <i>Guildhall</i> ).                                                                  | Leamington Priors ( <i>Public Library, Town Hall</i> ).                         |
| Birmingham ( <i>Birmingham and Midland Institute, Cannon Street</i> ).                          | Leeds ( <i>Town Clerk's Office, Town Hall</i> ).                                |
| Bolton-le-Moors ( <i>Public Library, Exchange Buildings</i> ).                                  | Leicester ( <i>Corporation Library, Town Hall</i> ).                            |
| Bradford, Yorkshire ( <i>Borough Accountant's Office, Corporation Buildings, Swan Street</i> ). | Liverpool ( <i>Free Public Library, Duke Street</i> ).                          |
| Brighton ( <i>Town Hall</i> ).                                                                  | Macclesfield.                                                                   |
| Bristol ( <i>City Library, King Street</i> ).                                                   | Manchester ( <i>Chetham Hospital, Camp Field</i> ).                             |
| Burnley.                                                                                        | Newark, Nottingham ( <i>Mechanics' Institute, Middle Gate</i> ).                |
| Cambridge ( <i>Free Library, Jesus Lane</i> ).                                                  | Newcastle-upon-Tyne.                                                            |
| Canterbury ( <i>Municipal Museum, Guildhall Street</i> ).                                       | Newport, Monmouth ( <i>Commercial Room, Town Hall</i> ).                        |
| Carlisle ( <i>Free Library, Police Office</i> ).                                                | Northampton.                                                                    |
| Chester ( <i>Town Hall, Northgate St.</i> ).                                                    | Norwich ( <i>Free Library, St. John's, Maddermarket</i> ).                      |
| Cork ( <i>Royal Cork Institution, Nelson Place</i> ).                                           | Nottingham ( <i>Corporation Rooms, St. Peter's Churchside</i> ).                |
| Crewe ( <i>Railway Station</i> ).                                                               | Oxford ( <i>Public Free Library, Town Hall</i> ).                               |
| Darlington.                                                                                     | Paisley ( <i>Government School of Designs, Gilmour Street</i> ).                |
| Drogheda.                                                                                       | Plymouth ( <i>Mechanics' Institute, Princess Square</i> ).                      |
| Dublin ( <i>Royal Dublin Society, Kildare Street</i> ).                                         | Preston ( <i>Dr. Shepherd's Library, the Institution, Avenham</i> ).            |
| Falmouth ( <i>Public Library, Church Street</i> ).                                              | Reading ( <i>Literary, Scientific and Mechanics' Institution, London St.</i> ). |
| Gateshead.                                                                                      | Rochdale ( <i>Commissioners' Room, Smith Street</i> ).                          |
| Gorton ( <i>Railway Station</i> ).                                                              | Rotherham ( <i>Board of Health Offices, Howard Street</i> ).                    |
| Glasgow ( <i>Stirling's Library, Miller Street</i> ).                                           | Salford ( <i>Peel Park</i> ).                                                   |
| Grimsby, Great ( <i>Mechanics' Institution, Victoria Street</i> ).                              | Sheffield ( <i>Free Library, Surrey Street</i> ).                               |
| Hanley, Staffordshire Potteries ( <i>Town Hall</i> ).                                           | Shrewsbury ( <i>The Public Museum, College Street</i> ).                        |
| Hartlepool, West ( <i>Literary and Mechanics' Institute, Church Street</i> ).                   | Society of Arts ( <i>John Street Adelphi</i> ).                                 |
| Hertford ( <i>Public Library, Town Hall</i> ).                                                  | Southampton ( <i>Corporation Library, Audit House</i> ).                        |
| Huddersfield ( <i>Commissioners' Offices, No. 1, South Parade</i> ).                            | Stirling ( <i>Burgh Library, Town House, Broad Street</i> ).                    |
| Hull ( <i>Mechanics' Institute, George Street</i> ).                                            |                                                                                 |
| Ipswich ( <i>Museum Library, Museum Street</i> ).                                               |                                                                                 |
| Keighley ( <i>Mechanics' Institute, North Street</i> ).                                         |                                                                                 |

Stockport (*Court House, Vernon Street, Warren Street*).  
 Sunderland (*Corporation Museum, Athenæum, Fawcett Street*).  
 Wakefield (*Mechanics' Institution, Barston Square*).  
 Warrington.  
 Waterford (*Town Hall, The Mall*).  
 Wednesbury (*Board of Health Offices*).

Wexford (*Mechanics' Institute, Crescent Quay*).  
 Wigan.  
 Wolverhampton (*School of Practical Art, Darlington Street*).  
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 York (*Lower Council Chamber, Guild-hall*).

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     The Philadelphia Library.  
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